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page 14

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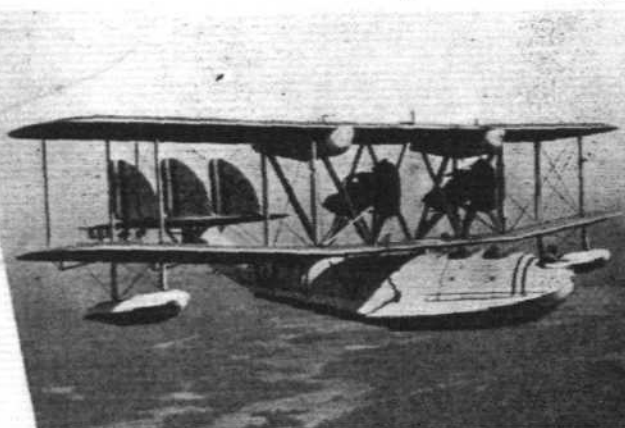
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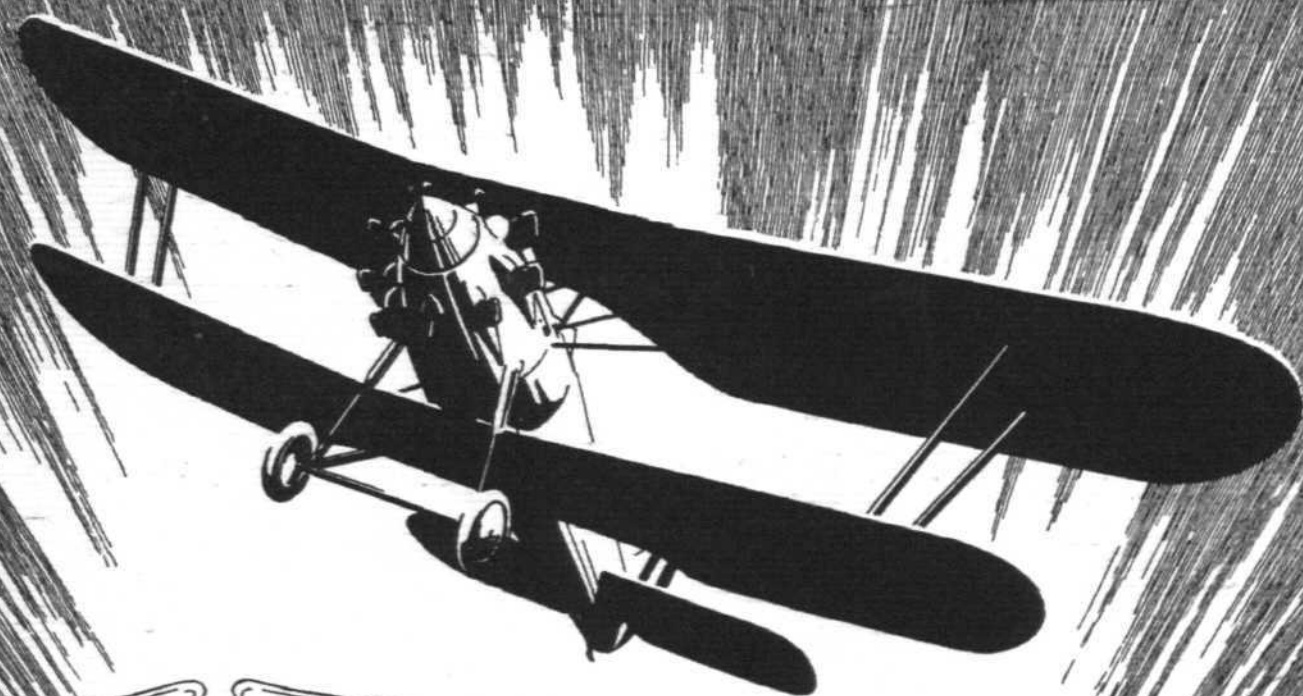
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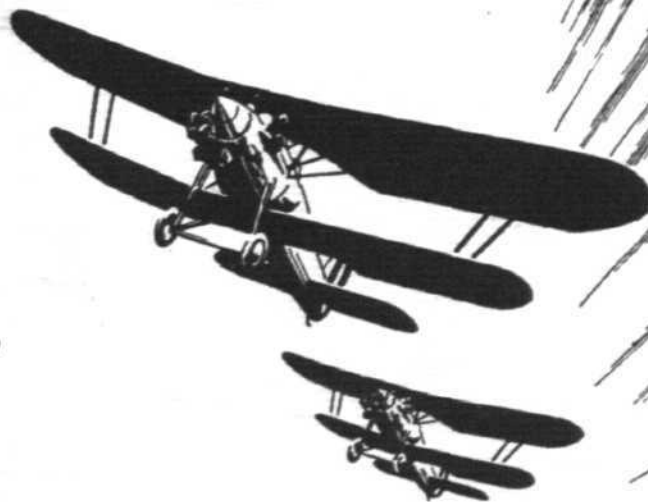
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No. 1054. (No. 10. Vol. XXI.)

MARCH 7, 1929

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CONTENTS

Editorial Comment :	PAGE
The Air Estimates	177
Burnelli Monoplane	179
R.T.H. Inertia Starters for Aero Engines	181
A. V. Roe	183
Air Estimates	184
Eddies	189
Private Flying : Luxurious Private Aircraft	190
Light Plane Clubs	192
Air Communications : By Brig.-Gen. P. R. C. Groves	194
Airisms From the Four Winds	195
Cruise of the R.A.F. Far East Flight	197
Royal Air Force	200
In Parliament	200

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1929.	
Mar. 7	Lecture, "Aircscrew Body Interference," by C. N. H. Lock, before R.Ae.S. and Inst.Ae.E.
Mar. 14	Lecture, "Engine Performance Tests," by Wing-Commr. C. B. Hynes, before R.Ae.S. and Inst.Ae.E.
Mar. 18	Lecture, "The Helicogyre," by V. Isacco, before R.Ae.S. and Inst.Ae.E.
Mar. 27	Royal Aero Club Annual General Meeting.
Mar. 29-30	Cinque Ports Flying Club Easter Meeting, Lympne.
April 11	Lecture, "Wind Tunnel Methods of the Eiffel Laboratory," by M. Lapresle, before R.Ae.S. and Inst.Ae.E.
April 18	Lecture, "R.101," by Col. V. C. Richmond, before R.Ae.S. and Inst.Ae.E.
April	Exhibition of Sporting and Touring Aircraft, Switzerland.
May 21	Northampton Air Pageant.
June 19-22	F.I.A. Conference, Copenhagen.
June 27-30	Rotterdam International Air Meeting.
July 5-6	King's Cup Race.
July 13	R.A.F. Display at Hendon.
July 16-27	7th International Aero Exhibition, Olympia.
July 28	International Flying Meeting, Sweden.
Aug. 1-14	French Light Plane Meeting, Orly.
Aug. 15	International Balloon Race, Poland.
Sept. 6-7	Schneider Trophy Race, Solent.
Sept. 10-20	Aero Club de France Meeting, Le Baule.
Oct. 1	Gordon-Bennett Balloon Race, St. Louis, U.S.A.
Oct. 31	Guggenheim Safe-Aircraft Competition Closes.

EDITORIAL COMMENT



The Air Estimates

THE Air Estimates for the year 1929 may be summed up as follows: Gross estimate, £19,645,100; Appropriations-in-aid, £3,445,100; Net estimate, £16,200,000; Net decrease compared with last year's estimates, £50,000. At the same time, the personnel all ranks is reduced from a total of 32,500 to 32,000. Taking it all round, the new estimates are just about what might have been expected, and there are no very significant changes under any of the votes. The 1929 Air Estimates do in fact represent the retarded programme of expansion which, as Sir Samuel Hoare points out in his Memorandum on the Air Estimates, three successive Parliaments have endorsed as the minimum compatible with the growing requirements of Imperial air defence.

Whilst Sir Samuel and his collaborators are to be congratulated on having achieved a small reduction in the Air Estimates for 1929, while providing for an increase in the strength of the Royal Air Force and not disregarding a progressive and real, albeit cautious, financial encouragement of commercial and civil flying, at the same time, it must be admitted that the way in which the Air Estimates are drawn up must prove very difficult to understand by the citizen who takes a live interest in the fighting forces and in the degree of protection which they afford him. The Royal Air Force is spoken of as a whole, and it is spoken of in terms of squadrons. Both these practices must tend to confusion of thought in the mind of the aforementioned intelligent citizen. When that citizen thinks of the Royal Air Force, he thinks of air defence. His mind turns to the sham air attacks on London in the last two years, and he wonders what protection he can count upon in the event of an air attack. When he reads that the strength of the force is equivalent approximately to 73 or 75 squadrons (according to whether a flying-boat unit is reckoned as a flight or as a squadron) he gains a certain impression, and that impression is likely to be erroneous. If he is groaning under a 4s. income tax and is further depressed at the growing rise in the price of petrol, he reflects that his protection

To this total, Sir Samuel Hoare proposes to add during the present year: one regular squadron, one cadre squadron, and three A.A.F. squadrons, bringing our total defence up to 38 squadrons. We may presume that the regular squadron will be a bombing squadron, and that the cadre squadron will belong to the Special Reserve. All five may therefore be bombing squadrons, which is sound policy.

About the commercial flying provisions we have no criticisms to make. All the steps taken are sound so far as they go. We look forward to the opening of a direct air service to India, and hope that others to South Africa and Australia, whether by aeroplane or by airship, will follow shortly.

Under Vote 3 (Technical and Warlike Stores) it is seen that there is an increase, on sub-head A (aeroplanes, seaplanes, engines and spares) of £641,000, although on Vote 3 as a whole the net increase is but £18,000. Presumably, the increase on sub-head A is, at least in part, accounted for by the provision, mentioned in the memorandum, for putting in hand the re-equipment, with aircraft of the latest design, of nineteen squadrons, including two in India. This re-equipment is long overdue, and it is good news to learn that at last a serious effort is to be made to equip the R.A.F. with up-to-date aircraft.

Details of sub-head A of Vote 3 show that a sum of £3,375,000 is set aside for complete aircraft. If it is assumed that the average cost is £10,000 per machine, this sum will only buy about 338 machines, which is not a very imposing number. Looked at in another way, assuming that there are 20 aircraft firms, and that the orders are evenly divided (which they will not be), each of the 20 firms will receive orders to the extent of £168,750, which, in view of the national importance of the aviation industry, is hardly an excessive figure.

For complete engines a sum of £1,910,000 has been set aside. As, so far as Government orders are concerned, there are but four engine firms, it would appear that these four will, on an average, do better than the aircraft firms, and that if the orders were evenly divided, each firm would receive orders to the extent of £477,500. As the development of new aero engines is a much more expensive affair than the production of a new aircraft type, this is as it should be.

These figures presume that cadre squadrons can rapidly be brought up to full strength, and they pay no regard to the communication squadron or to odd flights, such as the night-flying flight. They also presume that the two squadrons at Martlesham would be made available for defence in time of war.

THE aircraft-carrier *Eagle* and the cruiser *Danae* are ordered to return to England shortly after the conclusion of the combined fleet exercises, the former to refit and recommission and the latter to pay off for large repairs on being

replaced in the Fleet by the new cruiser *Sussex*. The *Eagle*, Capt. N. F. Laurence, D.S.O., is to leave Gibraltar on March 31, to call at Portsmouth on April 5, and to arrive at Devonport on April 16. The *Danae*, Capt. W. B. Mackenzie, will leave Gibraltar on April 1 and arrive at Chatham on April 6.

THE BURNELLI MONOPLANE

A New American Commercial Machine of Unusual Design. All-Metal Construction and Aerofoil-Section Fuselage

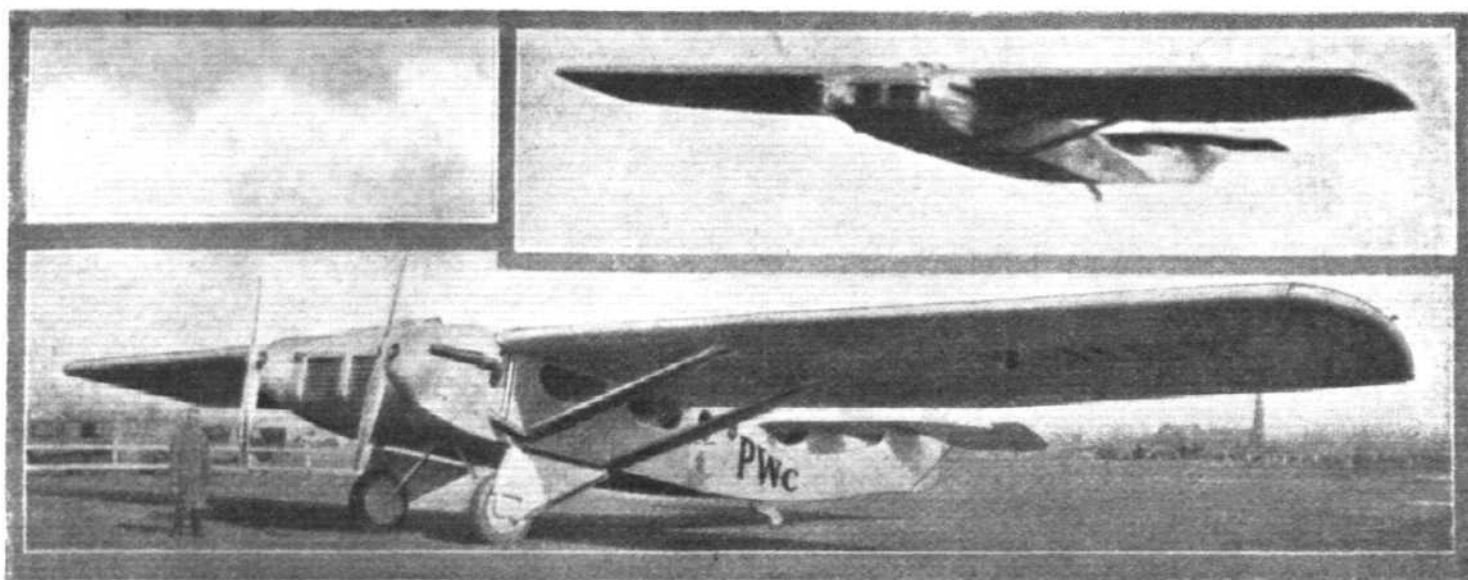
SEVERAL years ago (July 28, 1921) we described and illustrated an American machine, the Remington-Burnelli biplane, in which the fuselage was given an aerofoil section and in this way, it was claimed, contributed towards the total lift of the machine. This first biplane proved to be a successful flyer, with a comparatively good performance—and is still, we believe, in service—and just recently this principle has been further developed.

The new machine is a monoplane, designed by Mr. Vincent

data as to performance and the worth of the system—will be carried out throughout the States, while it is also planned to send a machine over to England for demonstration.

In this latter connection it may be of interest to note that the Burnelli aircraft are represented in this country by A. P. Thurston and Co., of 329, High Holborn, W.C.1.

In the following notes we are able to give our readers some brief particulars, together with general arrangement drawings and illustrations, of the Burnelli monoplane. It should be



THE BURNELLI MONOPLANE: Three-quarter front view, and (above) the machine in flight with the landing wheels retracted. It is fitted with two 625-700 h.p. Curtiss "Conqueror" engines.

J. Burnelli, and constructed under his supervision at the Aeromarine factory at Keyport, N.J., for Mr. P. W. Chapman for operation by Sky Lines, Inc. Besides embodying this aerofoil-section fuselage idea, this plane is also noteworthy in being of all-metal construction on somewhat original lines. We understand that a series of demonstration flights—and

incidentally full-scale test flights providing comparative mentioned that the machine was flight-tested on January 8 last by Lieut. Leigh Wade—one of the U.S. Round-the-World pilots—when four flights covering about 1 hour were made with successful results.

During the first flight, with only two up, the machine took



THE BURNELLI MONOPLANE: Rear and front views of this new and original American air liner. It is of all-metal construction, and the fuselage has an aerofoil section, which contributes to the lift.

off in 147 yards and was in the air after 6 secs. With the engines (two 625-700 h.p. Curtiss "Conquerors") two-thirds throttled, the plane climbed to 3,000 ft. in 7 mins. In the second flight, with five passengers, the machine was in the air in 7 secs. after a run of less than 100 yards, while in the third flight 12 passengers were carried and the take-off was 9 secs.; the fourth flight was similar to the previous one. The machine landed at an average of less than 50 m.p.h. and never ran more than 100 yards before coming to rest, although wheel brakes had not yet been fitted.

The Construction

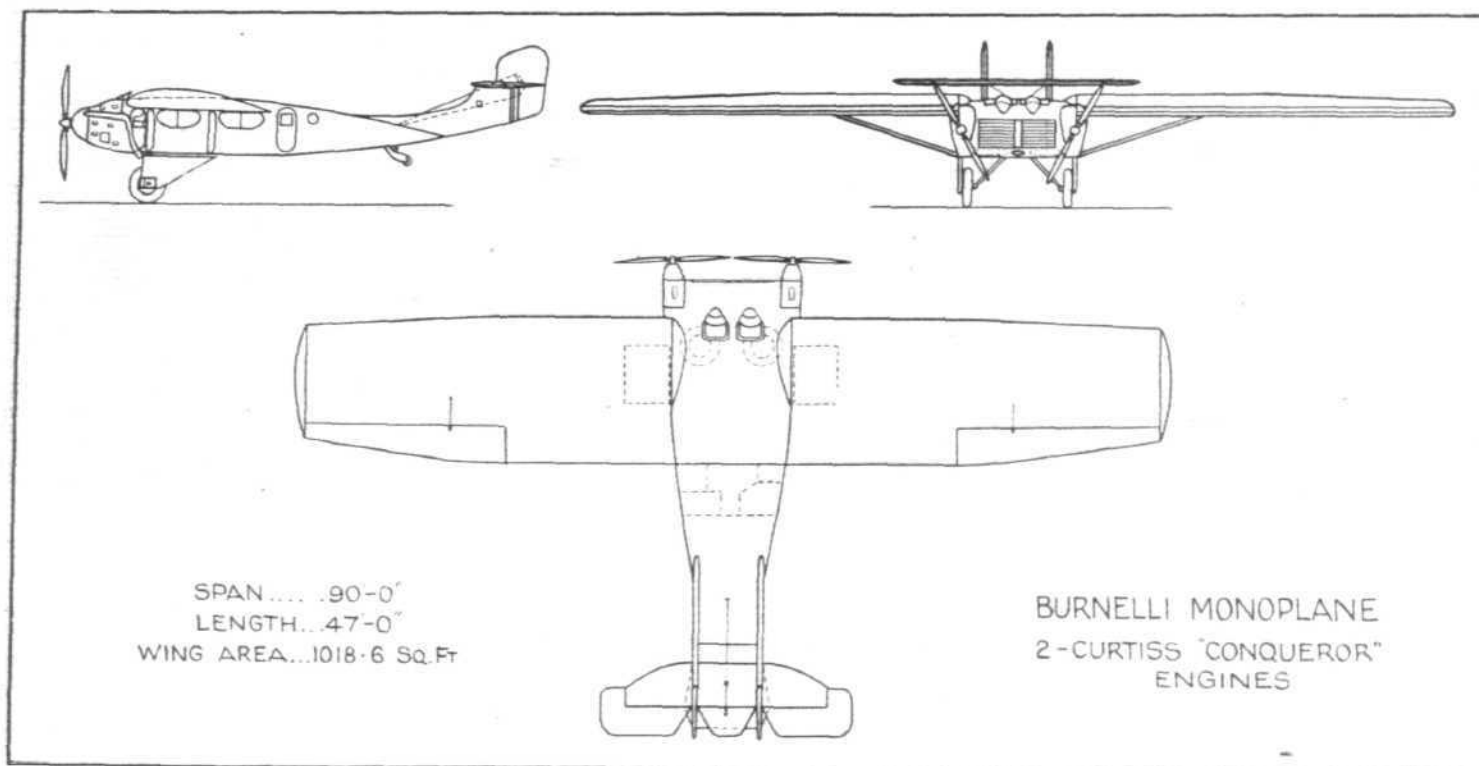
The wings, which are of Mr. Burnelli's own design, are of somewhat unusual construction, this being of the transverse stringer type, requiring no ribs, the stringers running from end to end and the whole being covered with corrugated sheet duralumin. Drag trusses are located at intervals along the wing.

As will be seen the wings are of thick section, slightly

of the fuselage, while doors and windows are provided in the bulkhead between the pilots' compartment and the cabin.

Another noteworthy feature of the Burnelli monoplane is the retractable undercarriage. By means of a lever, operated by the pilot or a mechanic, the two wheels can be retracted into the fuselage, this lever also indicating the position of the wheels, although to avoid the possibility of an error there is a red electric light which is visible to the pilot all the time the wheels are retracted. The wheels are carried by enclosed V-members, hinged to the lower outer edges of the fuselage, which fold inwards, the wheels fitting snugly within recesses formed in the bottom of the fuselage. The wheels may be retracted completely in 17 seconds, and extended again in 8 seconds.

The two Curtiss "Conqueror" engines are mounted, at the front "corners" of the fuselage, on a triangular frame, and can easily be swung out from the vertical line to allow of replacements or repairs being made without



THE BURNELLI MONOPLANE: General arrangement drawings.

tapering in plan-form at the tips. They are braced, on the underside, to the fuselage by fairly wide streamlined struts, one pair each side, and are attached directly to the sides of the fuselage, flush with the top.

The fuselage, which is 36 ft. long and 12 ft. wide, and accommodates 12-20 passengers, has a lift of 4 lbs. per sq. ft., and owing to its unusual design it reduces the landing speed at least 12 per cent.—this resulting from the air cushion effect it produces as it nears the ground. The wings are calculated to have at least 14½ lbs. per sq. ft. lift and have been tested to support a load of 28,000 lbs.

The furnishing and equipment of the cabin, which is 18 ft. long by 11 ft. 4 in. wide by 5 ft. 6 in. high, are quite luxurious. The "Adapto" upholstered seats are set on swivels and can be made to assume any position from upright to recumbent, and are wide, roomy and comfortable. The whole of the interior of the cabin is upholstered in grey, and in the centre is a large lounge, built over the main fuel tank.

At the rear of the cabin is a kitchenette, on the right, and a toilet room, on the left, both complete in every detail. Monel metal is used extensively in these compartments, which with the dural and aluminium gives a very smart appearance. In a panel at the rear of the cabin, where they are readily accessible, are the wireless controls, the wireless set having a range of 300 miles.

The cabin is sound-proofed with Balsam wool, while silencers specially designed for the engines are fitted, so that the machine is, it is claimed, as quiet as a motor car. Electric lights are fitted throughout, the main lights being set in the ceiling, while several base plugs are provided for reading and writing lights.

Two pilots' cockpits are located right forward in the top

removing the engines from the machine. Also the engines are easily "got at" from within the fuselage, so that adjustments can be made during flight.

Another point to note in connection with the engines is that they are mounted so that the line of thrust is at a slight angle to the fore and aft axis of the machine, i.e., the left engine has a tendency to pull to the left, and the right to the right. The machine can thus be flown with only one engine without requiring correction by use of the rudder. During the tests the machine actually climbed to 1,000 ft. on one engine, with the wheels retracted.

The rudders and elevators, which are balanced, are set high above the slipstream and are free from interference from the latter, while the horizontal stabiliser is adjustable.

Two fuel tanks of 280 galls. each are mounted in the wings, and a third tank of 440 galls. is located in the cabin. Thus the total fuel capacity is 1,000 galls., which would give it a range at cruising speed of 2,400 miles with 12 passengers (and 20 hours' fuel), or 800 miles with 20 passengers (and 7 hours' fuel). With the calculated overload of fuel it would have a range of 4,000 miles.

The principal characteristics of the Burnelli monoplane are:—

Span	90 ft.
Chord	14 ft.
O.a. length	47 ft.
Wing area (approx.)	1,018 sq. ft.
Weight (without fuel)	8,700 lbs.
Useful load (with 7 hours' fuel)	4,000 lbs.
Speed range	52 to 145 m.p.h.
Cruising speed	115 m.p.h.
Climb	940 ft./min.
Ceiling	16,500 ft.



The

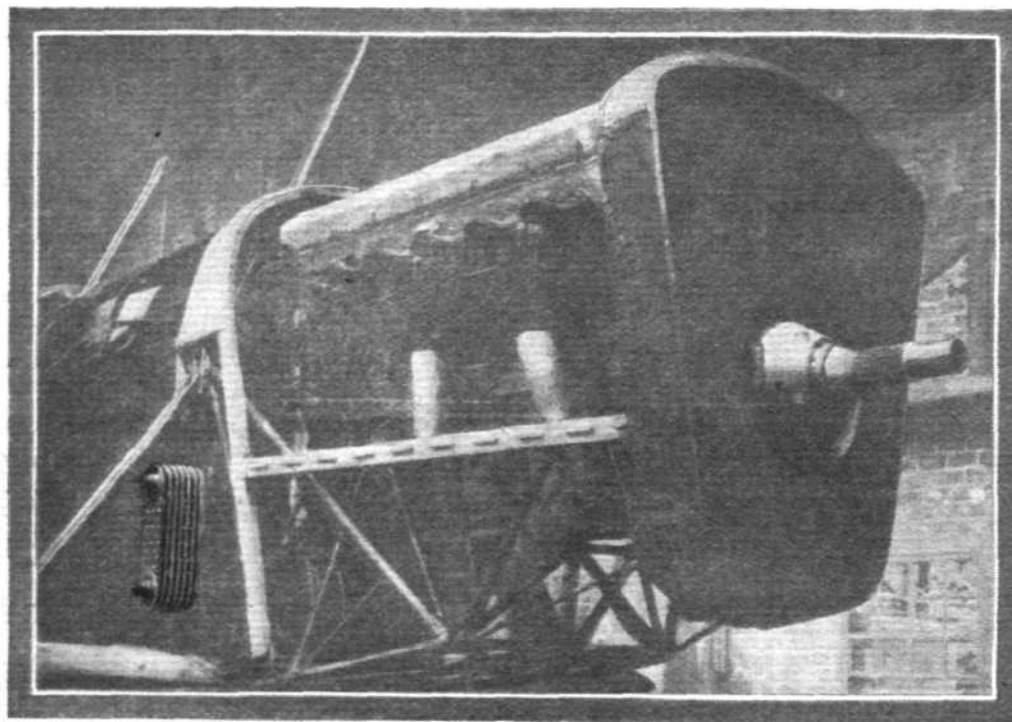
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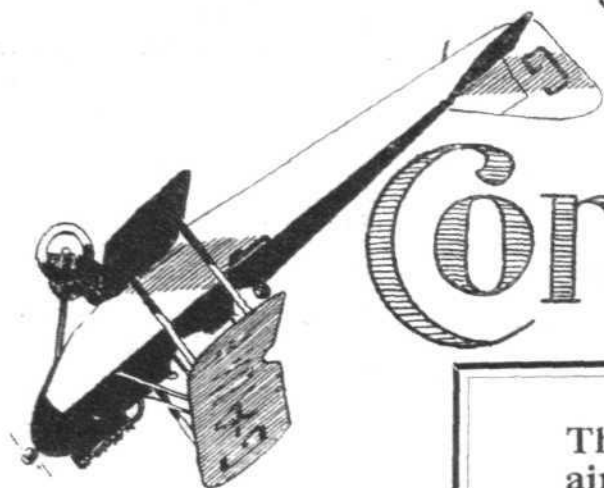
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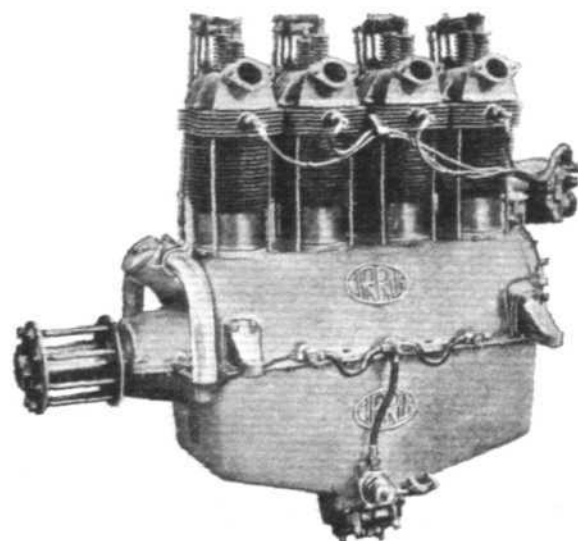
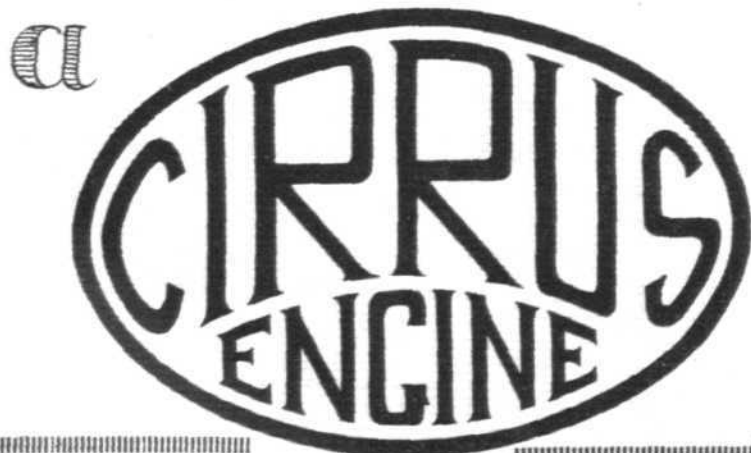
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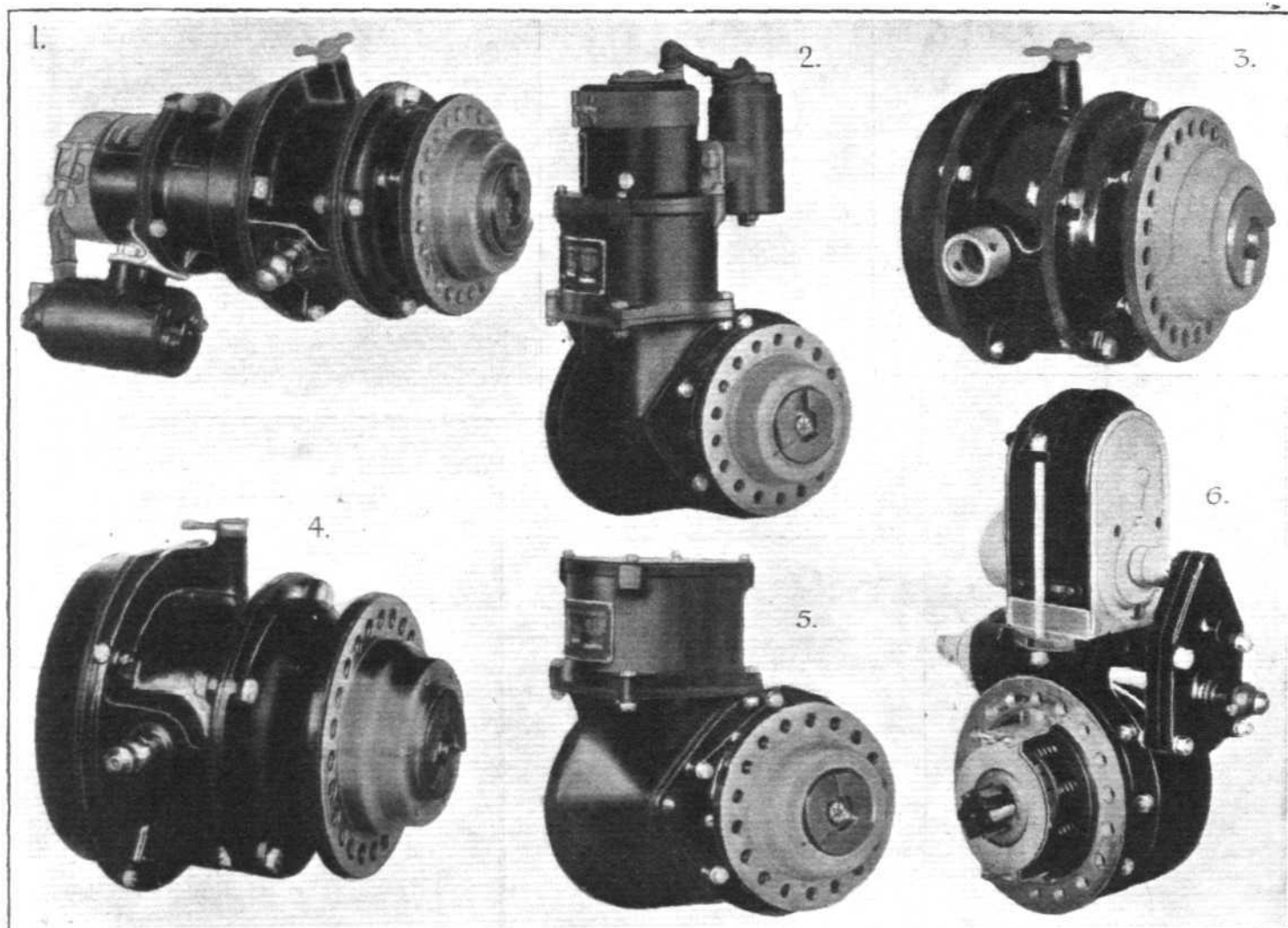
B.T.H. Introduce a Large Series

An easy method of starting large internal-combustion engines is by the use of inertia starters, which require only the same effort whatever be the engine stiffness or temperature conditions prevailing. These starters are made either for operation by hand or by electric motor, the essential principle involved being first, the storage of energy in a small free-running flywheel, and, secondly, the utilisation of this energy for rotating the engine crankshaft after removal of the externally-applied power.

Inertia starters are extensively used for aeroplane engines,

the gear reduction and starter jaw. The high momentary cranking speed thereby imparted to the engine crankshaft effects a quick start, and the starter is automatically disengaged from the engine at the instant of firing, the high speed of the engine throwing the starting jaw out of mesh.

In the event of engine backfire, there is no possibility of injury either to the operator or starter, as an incorporated torque-overload-release then disconnects the drive. This torque-overload-release takes the form of a multiple disc clutch operating in grease, and can be adjusted for any pre-



B.T.H. AERO ENGINE STARTERS : These photographs show a wide range of types, as follows :—1. Combined hand and electric inertia starter for engines up to 1,300 cub. in. This is the Series VI, and has the axis of the starter flywheel horizontal. 2. Is also a combined starter, and is known as the series VII. It has its axis vertical. This model is for use with engines up to 2,500 cub. in. The Series VI hand inertia starter for engines up to 1,300 cub. in. is shown in 3 (horizontal), and the hand inertia starter Series XI for engines up to 2,500 cub. ins. (horizontal) in 4. The vertical model for the larger engines (Series VII) is shown in 5. In 6 is shown the aviation hand-turning gear with booster magneto integrally mounted.

as, in addition to advantages already mentioned, they have minimum weight in proportion to capacity, and give a high initial engine cranking speed (about 80 r.p.m.). These starters are manufactured by the British Thomson-Houston Co., Ltd., Coventry, this company holding the sole manufacturing and selling rights for Great Britain of the Eclipse Machine Company's inertia starters, and are available either for operation by hand-cranking or by electric motor.

The hand inertia starter is operated by turning a crank handle, which is inserted in the spiral slot provided in the end of the crank extension. Hand cranking the starter usually for between 15 and 30 seconds, with gradual acceleration until a speed of about 80 r.p.m. is reached brings the starter flywheel up to a rotation of some 12,000 r.p.m., when removal of the crank handle and a pull on the operating rod engages the flywheel with the engine crankshaft through

determined torque to suit the engine to which the starter is applied.

Mechanically, the electric inertia starter is the same as the hand inertia starter, there being an electrical attachment bolted to the starter flywheel housing. Acceleration of the flywheel to operating speed is obtained by means of an electric motor, and it should be mentioned that as the current required is independent of the atmospheric temperature, the combined weight of starter and battery is the lowest possible—an important consideration on aeroplanes. Moreover, one-man starting from the pilot's cockpit is available, so that the engine can be cranked while the 'plane is in mid-air, and, in the event of a forced landing, the ability to start the engine conveniently without manual or external assistance is highly desirable.

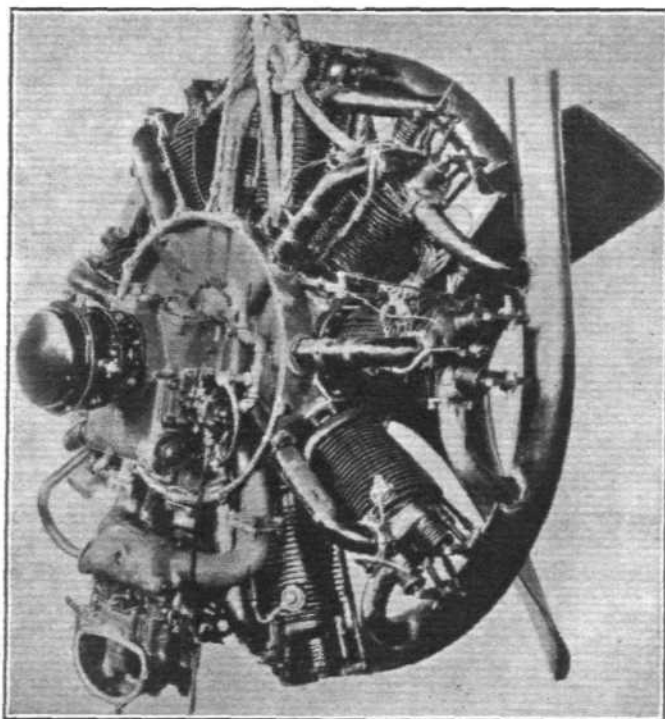
A push-and-pull switch in the cockpit gives remote control

of the starter through a solenoid switch mounted integrally with the electric motor. Pushing the switch button closes the electric circuit and allows the motor to accelerate the starter flywheel to operating speed, the time required usually being about five seconds. As soon as this speed is reached a pull on the switch button opens the electric circuit to the motor, and further pulling on the switch button acts on the operating lever of the starter through the medium of a cable or rod fastened to the end of the switch button rod, so as to engage the rotating starter drive jaw with the engine crankshaft. As soon as the engine fires, the starter jaw is automatically disengaged from the engine crankshaft by means of a quick thread. The operator then releases the switch button, and a return spring brings it back to its normal neutral position.

In addition to the electric attachment a hand-cranking shaft is provided so that the electric inertia starter can also be used as a hand inertia starter. As an automatic device is provided for connecting the electric motor armature to the

protection to the operator against "kicking," a ratchet is provided on the hand crankshaft.

The automatic meshing and demeshing mechanism is such that rotation of the hand crank by the operator causes the starter drive shaft to travel longitudinally for a fixed distance, thus effecting its engagement with the internal spline at the end of the engine crankshaft, or a separate



B.T.H. hand inertia starter (horizontal) fitted to Wright "Whirlwind" engine.

flywheel only when the electric motor is running, the starter is relieved at all times of any losses due to brush friction, and any excessive drag on the starter when it is operated by hand is avoided.

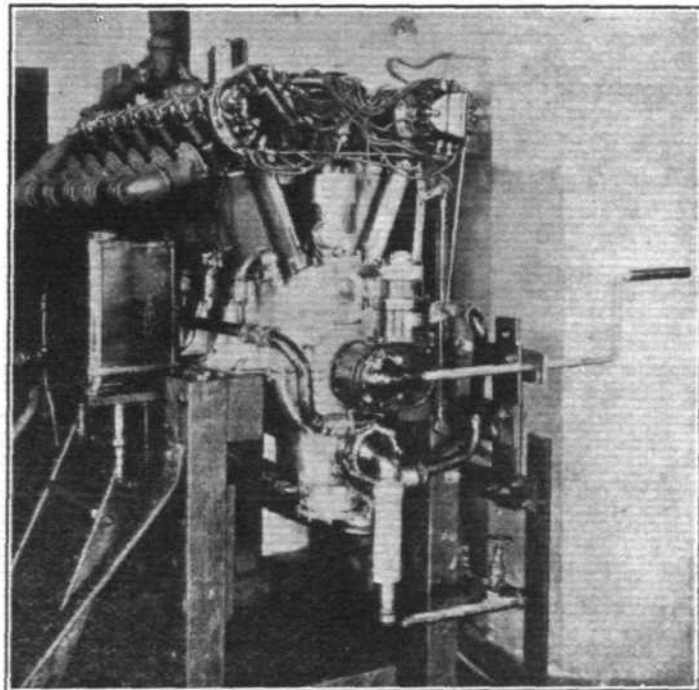
Twelve volts is the standard for these starters, and, for aeroplane engines, the starters have the following weights:—

B.T.H. Starters

Engine Capacity	Series	Flywheel Axis	Hand Pattern	Weight
				Combined Electric and Hand Pattern
Up to 1,300 cub. ins.	VI	Horizontal	21 lb.	31 lb.
Up to 2,500 cub. ins.	XI	Horizontal	23 lb.	35 lb.
	VII	Vertical	30½ lb.	41½ lb.

The standard arrangement is with the axis of the flywheel running in the horizontal plane, but for the larger engines (up to 2,500 cub. in.) the starters are also made with the axis of the flywheel in the vertical plane, whereby the overall length is decreased, but the weight increased as stated in the table. Starters for marine service weigh 2 lb. more in all instances.

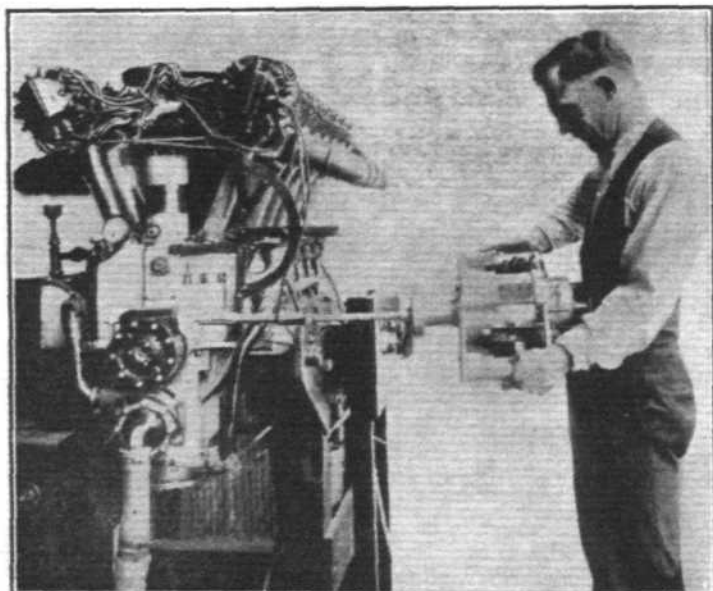
Besides the inertia starters described, a starter which has given satisfactory performance in many commercial aeroplanes is that known as the "Aviation Hand Turning Gear." This starter has been designed for cranking an engine directly by hand, and, although the weight has been cut down as much as possible, it can be depended on for reliability in operation. It consists of a worm reduction gear operating an automatic meshing and demeshing mechanism through an adjustable torque-overload release, which protects both operator and starter in the event of engine backfire, as described in connection with the hand and electric inertia starters. As a



B.T.H. combined hand and electric inertia starter (vertical model) fitted to "Liberty" engine.

extension of it. As soon as the starter drive shaft pinion is fully engaged, it rotates as a unit with the drive shaft revolving the engine. Positive engagement is assured and the automatic disengagement occurs the instant the engine fires.

Friction is reduced to a minimum by the careful design of all details, the use of ball-thrust bearings, etc., and ease of



B.T.H. Aviation hand-turning gear mounted on "Liberty" engine. It is operated with an external cranking unit.

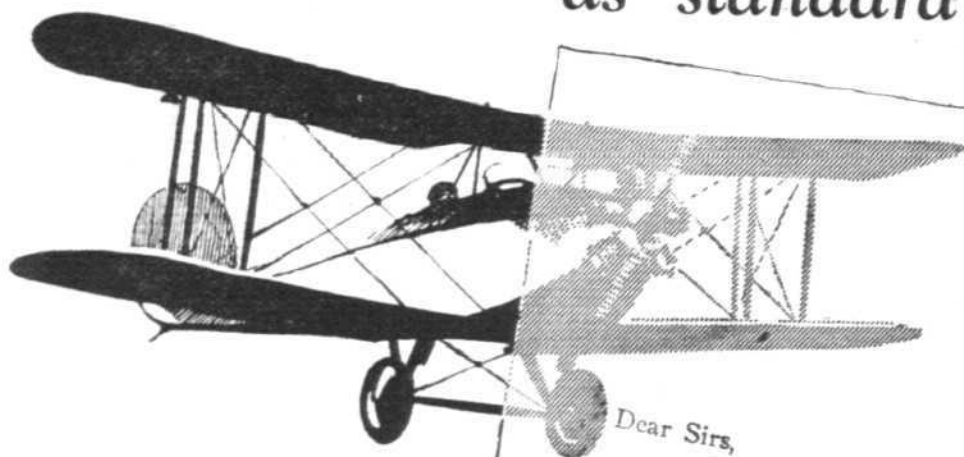
starting depends entirely on temperature conditions, and stiffness and size of the engine.

For engines equipped with magneto ignition, it is recommended that the aviation hand turning gear be used with an integrally-mounted booster magneto driven by speed-increasing-gear from the hand crankshaft. By this means engine starting is greatly facilitated, as, at low engine speeds, a hot spark is available for distribution to the cylinders through the regular engine magnetos.

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The period under review includes flying in extreme heat and cold, such as are found in Great Britain, and we are pleased to inform you that we have experienced no difficulty in maintaining the desired oil temperature and pressure since adopting Golden Shell Oil as our standard lubricant.

As regards starting up from cold in the morning, even with snow on the ground the combination of Shell petrol and oil has given us every satisfaction.

During this period no engine trouble whatsoever has been experienced.

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(Signed) P. L. Holmes, Secretary.
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AVIATION PIONEER HONoured

Knighthood Conferred Upon A. V. Roe

AMONG the names that appear in the New Year's Honours List none will be welcomed with greater satisfaction by aviation folk than that of Alliott Verdon Roe. "A. V.", as he is affectionately called by all his friends, is by way of being the "father" of the British aviation community, and his quiet and unassuming ways, coupled with a youthful enthusiasm, have endeared him to everyone with whom he comes in contact. There is something of Peter Pan about "A. V." which is wholly irresistible. In spite of the fact that he is old enough to have seen the very beginning of British aviation he has retained all the optimism and enthusiasm of the earliest days, and the honour which His Majesty has conferred upon "A. V." will be regarded as thoroughly well deserved.

Educated at St. Paul's School, A. V. Roe served his apprenticeship in engineering with the Lancashire & Yorkshire Railway, and later went to King's College, London, to prepare himself for the career which he had chosen. For a number of years he went to sea as a marine engineer, but finally gave up that profession in order to take up the study of flying. Commencing with the designing, building and flying of model aeroplanes "A. V." proceeded to man-carrying machines, of which he designed and built a considerable number.

Quite recently "A. V." had the disappointment of failing to get his claim to have made the first free flight in England recognised by a committee appointed by the Royal Aero Club. One may, or one may not, agree with the decision of that committee; that Roe carried out the earliest British design, construction and actual flying work will not be denied, and thus we honour him as the pioneer of British aircraft production. Whether he personally flew before anyone else matters really very little. He had the right ideas as to what an aeroplane should be, and that is the important point.

If one looks back upon the very early days of flying (and the volumes of *FLIGHT* enable one to do so to the beginning of 1909, and our precursor *The Automotor Journal* further back than that), one is impressed by the way in which, judged in the light of modern knowledge, "A. V." was a true pioneer in the very best sense of the word. At a time when aircraft pioneers all over the world were slowly feeling their way, and were almost exclusively concentrating on "box kites," of the "pusher" type, Roe sensed the advantages of the "tractor," in which the engine was mounted in the nose of a fuselage, and the pilot sat behind the wings. From about 1909-1910 Roe remained faithful to that ideal, and that he was right is proved by the fact that to-day the "pusher" type of aeroplane is never seen.

In modern times, with the cabin type of aeroplane becoming more and more popular, it is worth while recollecting that here again "A. V." was the pioneer. He was, it may be admitted, before his time in so far as after its first introduction the enclosed machine did not for many

years attain popularity. But as in the case of the tractor type, Roe had the vision and foresaw the time when the cabin machine would be wanted. In the early summer of 1912 a totally-enclosed monoplane made its appearance at Brooklands, where it was flown by Lieut. Parke, and a somewhat similar machine, but a biplane, took part in the military trials at Salisbury Plain in the summer of 1912. It was on this latter machine that Lieut. Parke had the terrifying experience of getting out of a "spin." At the time, the spin was not understood, and the particular experience was referred to as "Parke's Dive." We now know that it must have been a spin, and Parke found out purely by luck that by putting the "stick" central and forward, the spin could be stopped.

In 1912 "A. V." produced a twin-float tractor seaplane, and established a class of machine which to this day remains the standard type of British float seaplane.

Sufficient has, we think, been said to show that A. V. Roe well merits the title of pioneer on the technical side of British aviation. Concerning his career as an aircraft constructor it is of interest to recall that in the early days he was assisted very ably by his brother, H. V. Roe, with whom he formed a sort of verbal partnership as early as 1910, when work was seriously started at Manchester. While "A. V." attended to the technical side "H. V." looked after the financial, and it was owing to his ability that it became possible to "carry on."

In 1913 the firm A. V. Roe & Co. was formed as a limited company, with Mr. James G. Groves as chairman and "A. V." and "H. V." as joint managing directors. In spite of the fact that aviation was at that time scarcely a serious business, the firm managed to pay 10 per cent. dividends and a bonus, an achievement of which "H. V." was justly proud.

The famous "504" was designed in 1912 and produced in a standardised form the following year, and it was

mainly through orders for this type that the financial success of the firm became possible. The type still exists (in a slightly modernised form), and is used extensively for training, a lease of life which has not, it is safe to assert, been achieved by any other type of aircraft in the world.

It is not entirely without regret that one recalls that "A. V." is no longer connected with the firm that bears his name, but his recent joining forces with another British pioneer, Mr. S. E. Saunders, of Cowes, in company with that old helper and friend of his, Mr. John Lord, gives one hope that "A. V." has not by a very long way finished pioneering yet. It will come rather strange to the tongue to speak to and of "Sir Alliott," and we greatly fear that, from his intimate friends at least, he will have to be satisfied with the old familiar name bestowed upon him by his old designing office "A. V. p."



A. V. ROE

The Forced Landing Question

LANCASHIRE Executive of the National Farmers' Union met and decided to ask headquarters to go into the question of damage to farmers when aeroplanes come down on the land. Mr. Ashcroft (Irlam) said it was not only the damage

done by the aeroplane, but there was the rush of people to the spot where a machine had come down.

Royal Air Force Club

THE Annual General Meeting of the Royal Air Force Club will take place at 5 p.m. on Wednesday, March 20, 1929.

THE AIR ESTIMATES

A Net Decrease of £50,000

THE Air Estimates for the year 1929* were issued on March 2, and show a net decrease, as compared with last year's Estimates, of £50,000. The Gross Estimate is £19,645,100, but appropriations-in-aid are expected to reach £3,445,100, thus reducing the total for effective and non-effective services to £16,200,000. Personnel shows a decrease of 500, from 32,500 to 32,000.

The following table shows the net amounts required under the various votes, and in order to facilitate comparison with previous year's Estimates we have included the figures for the last five years.

Votes	NET ESTIMATES.					
	1929	1928	1927-28	1926-27	1925-26	1924-25
1 Pay, etc., of R.A.F.	3,323,000	3,401,000	3,160,000	3,405,000	3,412,000	2,941,000
2 Quartering, stores (except technical), supplies and transport	1,676,000	1,711,000	1,365,000	1,507,000	1,459,000	1,452,000
3 Technical and warlike stores (including experimental and research services) . .	6,585,000	6,567,000	6,424,000	6,091,000	5,650,000	6,050,000
4 Works, buildings and lands	1,700,000	1,700,000	1,900,000	2,347,000	2,572,000	2,127,000
5 Medical services	306,000	310,000	203,000	209,000	204,000	195,000
6 Educational services	498,000	504,000	507,000	432,000	486,000	480,000
7 Auxiliary and Reserve Forces	556,000	554,000	500,000	406,000	348,000	284,000
8 Civil Aviation	450,000	415,000	464,000	462,000	357,000	355,000
9 Meteorological and miscellaneous effective services	228,000	223,000	150,000	135,000	131,000	134,000
10 Air Ministry	661,000	657,000	687,000	761,000	751,000	710,000
Total effective services	15,983,000	16,042,000	15,360,000	15,755,000	15,370,000	14,728,000
11 Non-effective services (half-pay, pensions and other non-effective services) . .	217,000	208,000	190,000	245,000	143,000	133,000
Total effective and non-effective services	16,200,000	16,250,000	15,550,000	16,000,000	15,513,000	14,861,000

Personnel.

The grouping and numbers of personnel this year are as follows:—*Air Officers*: Vote 1, 22; Vote 5, 1; Vote 6, 3; Vote 7, 1; Vote 10, 11. Total, 38 (a decrease of 3). *Other Commissioned Officers*: Vote 1, 2,734; Vote 3, 31; Vote 5, 206; Vote 6, 126; Vote 7, 75; Vote 10, 128. Total, 3,300 (a decrease of 100). *Cadets*: Vote 6, 112 (a decrease of 13). *Warrant Officers*: Vote 1, 330; Vote 5, 9; Vote 6, 66; Vote 7, 14; Vote 10, 1 (a decrease of 100). *Non-commissioned Officers*: Vote 1, 4,235; Vote 3, 2; Vote 5, 190; Vote 6, 432; Vote 7, 138; Vote 10, 3. Total, 5,000 (same number as last year). *Aircraftmen*: Vote 1, 18,073; Vote 5, 586; Vote 6, 887; Vote 7, 333; Vote 10, 1. Total, 19,880 (a decrease of 120). *Apprentices*: Vote 1, 250; Vote 6, 3,000. Total, 3,250 (a decrease of 250). Number to be voted 32,000, a decrease of 500.

Financial Expenditure

Vote 1: The summarised statement of the amounts estimated to be required for pay, etc., of the Royal Air Force is as follows: Pay and personal allowances of officers, £1,209,000. Pay and personal allowances of airmen, £2,092,000; marriage allowances, £133,000; Miscellaneous allowances and payments, £29,750; Civilians, £845,500; Service gratuities to airmen on discharge, etc., £14,000; Recruiting staff and expenses, £8,750; Gross total, £4,332,000; appropriations-in-aid, £1,009,000; Net total, £3,323,000. Net decrease, £78,000.

Under Vote 2, the summarised figures are:—Lodging allowances and billeting, £114,000; Barrack services, £56,000; Fuel and light, £210,000; General stores, £156,000; Clothing, £271,000; Provisions and horses, £626,000; Transport, £375,000. Gross total, £1,808,000. Appropriations-in-aid, £132,000. Net total £1,676,000. Net decrease, £35,000.

Vote 3, *Technical and Warlike Stores*, provides for the following amounts: Aeroplanes, seaplanes, engines and spares, £6,329,000; Experimental and research establishments, £113,000; Inspection services, £168,000; Aircraft technical and warlike stores, £146,000; Armament and ammunition, £301,000; Electrical stores, £224,000; Miscellaneous research and development, £108,000; Miscellaneous materials, £194,000; Balloons and hangars, £27,000; Mechanical and other transport, £284,000; Petrol and oil, £560,000; Rewards to inventors and miscellaneous claims (including war liabilities), £50,000; Purchase of airships, £92,000; Airship development, £299,000; Gross total, £9,095,000. Deduct for probable underspending £450,000. Appropriations-in-aid £2,060,000. Net total £6,585,000. Net increase £18,000.

The summarised statement under Vote 4 is as follows:—Staff for works services, £231,000; New works, additions and alterations amounting to £2,500 each and upwards, £1,007,000; New works, additions and alterations under £2,500 each, £120,000; Ordinary repairs, renewals and maintenance, £475,000; Grants towards the cost of works, £10,000; Purchases of lands and buildings, £115,000; Rents, compen-

sations and reinstatements, £30,000; Incidental expenses of Air Ministry estates, £13,000; Provision of telephone and telegraph services, £1,000; Miscellaneous works services, £9,000; Stores and plant for works (net), £19,000; Machine tools, £30,000; Gross total, £2,060,000; Deduct for probable underspending on the Vote as a whole, £200,000; Appropriations-in-aid, £160,000; Net total, £1,700,000; Amount exactly the same as last year.

Vote 5, *Medical Services*: Pay and personal allowances of officers, £133,500; Pay and personal allowances of airmen, £92,000; Nursing service, £23,000; Fees, etc., to civilian medical practitioners, £3,000; Civilians employed in hospitals

and sick quarters, £20,000; Medical stores and supplies, £14,000; Payments to hospitals, £29,000; Miscellaneous charges, £2,000. Gross total, £316,500; Appropriations-in-aid, £10,500. Net total £306,000, being a net decrease of £4,000.

Educational Services, Vote 6, are estimated to require the following amounts: Imperial Defence College, £2,900; R.A.F. Staff College, Andover, £14,250; R.A.F. College and Electrical and Wireless School, Cranwell, £134,500; School of Technical Training (Apprentices), Halton, £253,000; School of Technical Training (Men), Manston, £43,000; School of Physical Training, Uxbridge, £2,500; School of Store Accounting and Storekeeping, Kidbrooke, £3,000; General and vocational training, £50,500; Miscellaneous educational services, £4,350; Gross total, £508,000; Appropriations-in-aid, £10,000; Net total, £498,000. Net decrease, £6,000.

Vote 7, *Auxiliary and Reserve Forces, R.A.F. Reserve*: Pay and personal allowances of permanent staff, £4,300; Pay and personal allowances during training, £13,000; Retaining fees and reserve pay, £237,600; Payments to civil companies for training courses, £169,000; Miscellaneous expenses, £1,200; *Special Reserve and Auxiliary Air Force*: Pay and personal allowances of headquarters staff, £9,700; *Special Reserve*: Pay and personal allowances of regular personnel, £61,000; Training, £4,000; Miscellaneous expenses, £1,000. *Auxiliary Air Force*: Pay and personal allowances of regular staff, £34,000; Grants to County Associations, £6,400; Training, £8,000; Miscellaneous expenses, £1,500. *University Air Squadrons*: Pay and personal allowances of instructors, etc., £4,200; Miscellaneous expenses, £900. *Voluntary Aid Detachments*: Miscellaneous expenses, £300; Gross total, £556,100; Appropriations-in-aid, £100. Net total, £556,000. Net increase, £2,000.

Vote 8, *Civil Aviation*, is estimated to require the following amounts:—Civil aviation aerodromes, £29,000; Air routes, surveys, etc., £22,000; Technical equipment, £10,000; Works, buildings and lands, £30,000; Miscellaneous, £2,000; International Aircraft Exhibition, £7,000; Civil aviation subsidies, £373,000; Gross total, £473,000; Appropriations-in-aid, £23,000. Net total, £450,000. Net increase, £35,000.

Vote 9, *Meteorological and Miscellaneous Effective Services*: Salaries and allowances of the Meteorological Office, £50,500; Salaries, wages and allowances of staff at meteorological stations, £58,500; Fuel, light and transport, £4,000; Instruments, equipment, stores and research, £10,000; Works services, £6,500; Telegraphic, telephonic and miscellaneous charges, £13,700; Superannuation, £1,800; Appropriations-in-aid, £12,500. Net total, Meteorological services, £132,500. *Miscellaneous Effective Services*: Compensation for losses, etc., £12,000; Losses by exchange, etc., £300; Payment to the War Office in respect of Prison Services, £1,500; Telegraphic and telephonic charges, postage abroad, £60,200; Miscellaneous, £24,000; Allowances to ministers of religion, £7,000; Appropriations-in-aid, £9,500. Net total: Miscellaneous Effective Services, £95,500. Gross total, Vote 9, £250,000. Appropriations-in-aid, £22,000. Net total, Vote 9, £228,000. Net increase, £5,000.

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The Times, 21st February, 1929.

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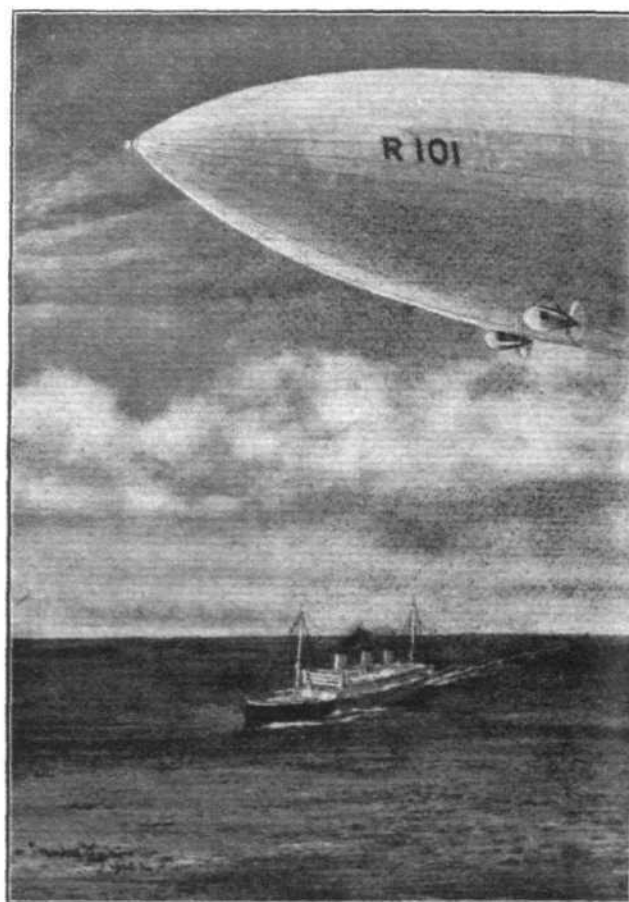
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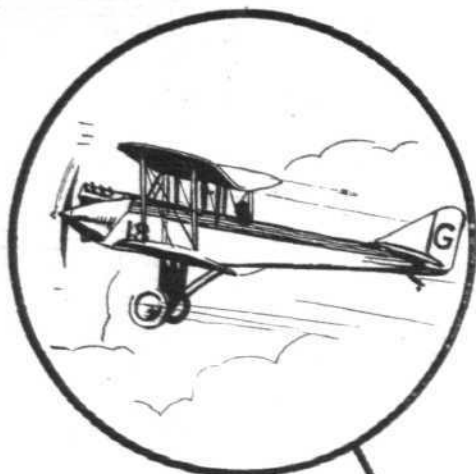
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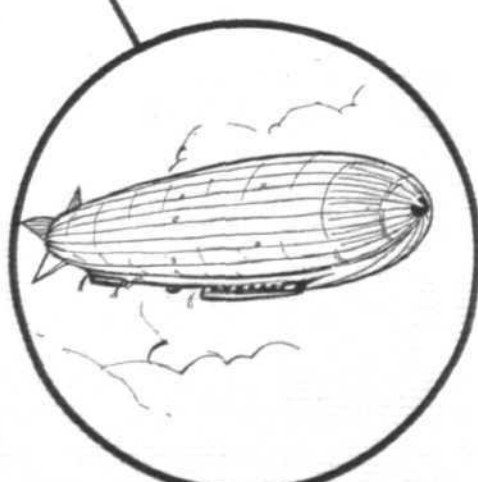
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The Air Ministry, Vote 10, is estimated to require a net total of £661,000, as follows:—Salaries of the Air Council and Department of the Secretary, £312,900; Salaries of the Department of the Chief of the Air Staff, £122,600; Salaries of the Department of the Air Member for Personnel, £45,500; Salaries of the Department of the Air Member for Supply and Research, £137,900; Salaries of the Directorate of Civil Aviation and the Accidents Branch, £17,700; Pay of messengers, porters, etc., £25,500; Contingent expenses, £900; Gross total, £663,000; Appropriations-in-aid, £2,000. Net total, £661,000. Net increase, £4,000.

Vote 11, *Non-effective Services*: Rewards to officers, warrant officers, non-commissioned officers and aircraftmen, £350; Half-pay of officers, £6,000; Service and disability retired pay and gratuities of officers and nurses, £129,000; Pensions to wounded officers, £550; Service and disability pensions and gratuities—warrant officers, non-commissioned officers and aircraftmen—£45,000; Pensions, gratuities and allowances to widows, children, etc., £20,500; Civil non-effective payments, recurrent charges, £7,200; Civil non-effective payments, gratuities and other non-recurrent charges, £7,600; Injury grants, £4,750; Commutation of retired pay, wounds pensions, etc., £12,000; Relief fund, £500; Compassionate grants, £50; Gross total, £233,500; Appropriations-in-aid, £16,500; Net total, £217,000. Net increase, £9,000.

As in previous years, the Air Estimates are explained in a Memorandum by the Secretary of State for Air,* Sir Samuel Hoare, which we give in full below:—

Memorandum by Secretary of State for Air

THE net total of Air Estimates submitted to Parliament for the coming year is £16,200,000, being a decrease of £50,000 as compared with 1928. The gross total is £19,645,100, which shows an increase of £510,000. The "super-cut" has been increased by £150,000, in order to discount at its very maximum the possibility that various liabilities for which provision is taken will fail to mature before the end of the year. Details are shown in the following table:—

	1929.	1928.	+ or —
True Gross (total of expenditure subheads)	20,295,100	19,635,100	+ 660,000
Deduct super-cut ..	650,000	500,000	+ 150,000
Gross Estimate ..	19,645,100	19,135,100	+ 510,000
Deduct Fleet Air Arm grant ..	1,300,000	1,080,000	+ 220,000
Deduct other Appropriations-in-aid ..	2,145,100	1,805,100	+ 340,000
Net Estimate ..	16,200,000	16,250,000	— 50,000

It will be seen that the gross increase (after allowing for the super-cut) is outweighed by a slightly larger increase in appropriations-in-aid. The expansion of the Fleet Air Arm accounts for £220,000 of this latter increase; the balance is mainly in respect of larger payments due from India. Notwithstanding the growth of the Royal Air Force and civil aviation, none of the net votes shows any very notable variation, and the total is, as stated, actually down by £50,000. It is hardly necessary for me to say that this result has only been achieved by most strenuous efforts after economy. So far it has been possible to avoid the sacrifice of any essential feature of policy and we have contrived, in particular, to proceed by gradual stages with the modest scheme of expansion which three successive Parliaments have endorsed as the minimum compatible with the growing requirements of Imperial air defence. I must, however, add a warning that this progressive reduction of net Air Estimates cannot be expected to continue.

Strength and Distribution of the Royal Air Force.—The present strength of the Royal Air Force is equivalent approximately to 73 squadrons, of which eight are on a cadre or auxiliary basis. In the past year two squadrons have been added to the Indian establishment, two new units of flying-boats have been formed, and one new flight has been provided for the Fleet Air Arm.

In 1929 it is intended to add the equivalent of seven new squadrons, viz., one regular squadron, one cadre squadron and three Auxiliary Air Force squadrons for Home Defence, two new flights for the Fleet Air Arm, and one more unit of flying-boats. This last will be stationed for a time in home waters, but will later proceed overseas.

It has been decided that the flying-boat units which have previously been described as "flights" and reckoned as the equivalent of half a squadron shall, in the future, be

designated "squadrons" and reckoned as such. The reason for this change in nomenclature is that units of large flying-boats do not resemble in function or in equipment the units which are organized as flights for embarkation in aircraft carriers and other ships. The change does not involve any increase in the normal establishment of these units.

On the new basis of calculation, the present strength of the Royal Air Force is about 75 squadrons, and will rise in 1929 to a total of 82 squadrons, including 12 cadre or auxiliary squadrons.

The squadron of flying-boats which reached Singapore in February, 1928, carried out the remainder of its itinerary according to plan, and after flying round the Australian Continent and visiting Hong-Kong, French Indo-China and the Philippines, returned in January, 1929, to Singapore, on which station it will now normally be based. This cruise of a year's duration, covering over 27,000 miles, affords an example of the reliability of modern service aircraft. Each boat completed 355 hours' flying, and, with the exception of overhauls at Karachi, Singapore and Melbourne, remained afloat for the whole period. On one occasion, only was the cruise interrupted by mechanical trouble.

Another squadron of flying-boats is about to leave this country for Basrah, following approximately the same route as that taken by the Far East squadron. It will be employed in the Persian Gulf with the object of gaining experience of the utility of this type of aircraft under the climatic and other conditions obtaining in that area.

The usual annual flight between Cairo and the Cape is now in progress. Manœuvres will be carried out at various places en route to assist the training of local ground forces. Aircraft of the South African Air Force will co-operate in the Khartoum-Cape portion of the flight.

The long-distance flight between Egypt and Nigeria is to be repeated in the autumn of the present year.

Operational Activities.—During the past year the Royal Air Force has been engaged in active operations, in most of the overseas theatres in which its squadrons are stationed, including such operations as those against the Akhwan raiders in the Southern Desert of Iraq, against Yemen forces which encroached on the territory of the Aden Protectorate, and on the frontier of India. Although the Iraq and Aden operations have made serious demands on the units concerned, they have been carried out with conspicuous success; but in both areas the position still calls for continued vigilance and constant activity. On the North-West Frontier the rapidity and effectiveness of air action reduced the duration of the operations to a few days.

During the latter part of the year the Royal Air Force in India have been called upon to evacuate from Kabul members of the staffs of the various legations and their families, and other European and Indian residents. A total of 586 individuals of 11 different nationalities have so far been evacuated. Most of the machines used for this purpose were flown from Iraq to Peshawar, a distance of some 2,500 miles, thus affording a striking proof of the mobility of the Air Arm.

Dominion Co-operation.—H.M. Government in Australia requested in the earlier part of last year that a senior air officer from the Royal Air Force should visit the Commonwealth to advise on air policy. The officer selected, Air Chief Marshal Sir John Salmond, made a thorough study of the air organisation of the Commonwealth and formulated a plan for the development of the Royal Australian Air Force. This contemplates three stages of development each occupying three years and the Commonwealth Government have already announced their approval of the carrying out of the first stage.

At the request of H.M. Government in New Zealand, Sir John Salmond extended his journey to that Dominion, and drew up a scheme for the development of the New Zealand Air Force. The change in government in the Dominion prevented a decision being reached, and the proposals are understood to be now under consideration by the new Cabinet.

Personnel.—A comprehensive review has recently been undertaken of the problem of providing the Royal Air Force with officers of the requisite grades in appropriate numbers. While the various measures taken in the past have been substantially successful in producing the officers required from year to year, the conditions of the first 10 years of the existence of the Royal Air Force have been abnormal as regards age-distribution and retirement. Certain new measures have now been promulgated which are intended to secure a satisfactory position in these respects in the General Duties Branch.

Permanent officers are to be provided only in such numbers as will suffice to fill those posts which essentially need men

* Cmd. 3274. Published by H.M. Stationery Office, price 3d. net.

who are looking to the Royal Air Force for their life career. This body of permanent officers will form the nucleus of the Royal Air Force in peace and of its expansion in war, and will provide the specialists in engineering, wireless telegraphy, armament, etc., on whom the technical work of the service depends. It is obvious that they must be offered a career sufficiently favourable to attract the best material from the public schools and universities. Steps have, therefore, been taken to ensure an adequate flow of promotion.

In order to assist in giving effect to these principles, and also to improve the careers of airmen, a substantial number of specialist and administrative posts have been scheduled to be filled by warrant officers and, in certain cases, by civilians, thus relieving the officer establishment.

It has been a guiding principle that the scheme, taken as a whole, should involve no greater expenditure than the existing scheme of personnel organisation. Despite the fact that this existing organisation was on a very economical basis, and that a substantially improved career will be offered to the permanent officer, this condition has been satisfied.

Officers with short service commissions leave the Royal Air Force at a comparatively early age, with experience and qualifications which should make them eminently suitable for certain types of post in commerce and industry. During their service they are encouraged and assisted in every way possible through the agency of the Royal Air Force educational organisation to prepare themselves for civil employment. Some time ago a special organisation was set up in touch with leading industrial interests, and with a secretary in the Education Branch of the Air Ministry, to assist them in finding suitable appointments on their return to civil life. This organisation gives officers advice as to the practical needs of employers, and places them in touch with openings in the type of work for which they are best fitted. Satisfactory results are being obtained.

Vote 1 reflects the changes indicated above in a decreased provision for the pay of officers and an increased provision for the pay of warrant officers and civilians. A great part of the latter increase is, however, due to the continuation of the policy, referred to in my previous memoranda, of substituting civilians for airmen wherever advantageous. The continuing expansion of the Royal Air Force results in an increase of £59,000 in the gross total of the Vote, which is not, however, reflected in the net figure owing to an increase in appropriations-in-aid due to other causes.

Training.—During the coming year the Electrical and Wireless School, where officers and airmen are trained in signal duties and where aircraft apprentices entered for training in the electrical and wireless trades are given their three-year course, will be moved from Flowerdown, in Hampshire, to Cranwell, in Lincolnshire. A proportion of the aircraft apprentices under training in other trades were formerly accommodated at Cranwell, but all these apprentices have for some time past been concentrated at Halton, in Buckinghamshire. The Cranwell command will now include the Royal Air Force College (previously designated the Royal Air Force Cadet College) and the Electrical and Wireless School.

This change will result in substantial economies on the Cranwell subhead; and, notwithstanding small increases on other subheads of Vote 6 (Educational Services), there will be a net decrease of £6,000 on the total of the Vote.

Auxiliary and Reserve Forces.—The total for Vote 7 remains practically unchanged, increases due to normal expansion being counterbalanced by a reduction in the cost of training of Reserve pilots.

The auxiliary and reserve forces have shown a highly satisfactory development during the past year, and it is proposed to continue their development on established lines. Taking cadre and auxiliary squadrons together, it may be said broadly that numbers have doubled in the last 18 months. In general, units have over 80 per cent. of their establishment in officers commissioned or in process of learning to fly and over 90 per cent. of their establishment in airmen.

Competition at Oxford and Cambridge for entry into the University air squadrons remains very keen, and these bodies are continuing to perform exceedingly useful functions. A considerable number of candidates have been forthcoming from this source, both for permanent commissions and for *ab initio* training in the Reserve.

Technical Equipment.—The gross total of Vote 3 (Technical and Warlike Equipment) shows an increase of £615,000 over last year. This is, however, reduced by an increase of £100,000 in the super-cut. Provision is made in the Vote for putting in hand the re-equipment, with aircraft of the

latest design, of 19 squadrons (including two in India) and several training units. In addition, three flights of the Fleet Air Arm are to be re-armed during the year.

The increased reliability of aircraft and aero engines now in service has rendered it possible still further to reduce the provision for aircraft and engine spares by £156,000. This is now below 75 per cent. of the corresponding amount in 1926, in spite of the expansion which has taken place in the intervening period.

The fitting of automatic slots to service aircraft is proceeding rapidly.

A parachute is now provided for every machine in the Service which is capable of carrying it, except sea-going aircraft. A new design of quick-release attachment for use in these latter has been tried out, but requires further development before it can be finally pronounced suitable for service conditions. In 1928, six lives were saved by the use of parachutes.

Provision is included for the completion of the programme of replacement of light tenders and touring cars, which was begun last year, and was necessary in view of the uneconomic condition of the existing vehicles, due to the length of time they had been in service. A beginning will also be made with the replacement of the heavier classes of mechanical transport by six-wheeled vehicles. It has also been found necessary to provide for the replacement of some of the armoured cars in Iraq, which have, of course, had to operate in this theatre under exceptionally difficult conditions of terrain and climate.

Research and Technical Development.—The estimated cost of research and technical experimental services, details of which are given in Appendix I of the Estimates, shows an increase of £102,500 over that of last year. Of this increase, nearly £40,000 is due to capital expenditure in respect of the variable density Wind Tunnel, to which reference was made in my memorandum of last year. The remaining increase is mainly caused by heavier expenditure on experimental engine construction. The programme includes provision for a number of new experimental types of both civil and Service aircraft.

Research on compression-ignition engines, on the development of increased horse-power by supercharging, and on the economical consumption of fuel, has given extremely promising results during the past year, and is being pressed forward in 1929. The design of an instrument capable of recording, at any moment, the rate at which fuel is flowing into the engine has been completed, and practical experiments with its use have had marked success.

The Aeronautical Research Committee have undertaken the investigation of the problem of noise in civil aircraft as affecting the comfort of passengers.

Considerable experimental study has been made of the stresses occasioned by rapid manoeuvre on the part of modern fighting aircraft of the high-speed type. This research has led to an inquiry being instituted into the relation of such stresses to the load factors commonly accepted as sufficient for safety, and is regarded as likely to produce results of considerable importance.

A reduction of £11,000 has been effected in the estimate for the cost of the Royal Aircraft Establishment.

A reorganisation has taken place in the department responsible for the technical investigation of civil aircraft for certificates of airworthiness. This has hitherto been centrally located at Farnborough, all the relevant data being forwarded there for examination. It has been found that this process can be more expeditiously carried out by technical officers stationed at manufacturers' works and making the necessary calculations side by side with the firm's design staffs. Concurrently with this re-organisation, a procedure has been introduced whereby a firm of established reputation can be "approved" by the Ministry for design calculation, after which the investigation required for the certificate is reduced to general supervision and test check by the resident technical officer, thus avoiding delays and assisting manufacturers in the progress of their work.

Airships.—The two airships, R.100 and R.101, should be completed early in the financial year. Owing to delay which has occurred, some expenditure provided for in last year's Estimates has had to be postponed until 1929. Apart from this, the bulk of the money provided for airships in these Estimates is in respect of flying operations at home and overseas.

Construction has taken longer than was anticipated, but this has been due to the fact that both airships pre-empt a great step forward in size, and embody novel principles of design. The airships should begin their flying trials in the spring, and I hope to see flights to overseas bases such as

Karachi and Montreal successfully carried out during the year.

The airship tower which H.M. Government in Canada undertook to put up at the Imperial Conference of 1926 has now been erected at the St. Hubert air port at Montreal. H.M. Government in the Union of South Africa have acquired a site for an airship base at Groutville, near Durban. The shed at Karachi has been erected, but some further work remains to be done before it can be formally taken over. The erection of the mooring tower at Karachi, which is being undertaken by the Government of India, is making good progress, and it should be finished during the summer.

Works.—The expenditure in 1929 on major new works, which were already in progress or provided for during the financial year 1928, shows an increase on the corresponding figure for the current year. There is, however, a more than corresponding decrease in expenditure on new works appearing for the first time in 1929, with the result that the total anticipated expenditure on major new works shows a slight decrease.

The new Vote 4 makes provision for the commencement of work on one new station for regular squadrons and three stations for non-regular units at home, and for a programme of concentration and improvements at Aden.

There is a considerable decrease in appropriations-in-aid owing to the final disposal of the greater part of the surplus land and stores which have temporarily swelled receipts during recent years. The overall deduction to discount unforeseen delays has, however, been increased to £200,000, and the net total remains at the same figure as in 1928.

Civil Aviation.—Vote 8 (Civil Aviation) has been increased to £450,000, a figure which will allow of the development of existing air services foreshadowed last year. The weekly Imperial air service to India is due to start in a month's time.

A sum of £349,000 (as against £230,000 in 1928) has been included to cover the actual liability in respect of subsidies payable to Imperial Airways, Ltd., for this service and the existing European services. Of this sum, £40,000 represents the purchase price of two aircraft belonging to the Air Ministry which have been sold to the company for use on the trans-Mediterranean section of the route. A corresponding credit has been taken in Vote 3 appropriations-in-aid in respect of this sale. The principal provisions of the new agreement were laid before Parliament in a White Paper (Cmd. 3143) in July last year.

Active negotiations are proceeding with the South African Government and the other governments interested with a view to the institution of an Imperial air service to South Africa, and provision has been made in these Estimates for necessary preliminary work.

In addition to the sum of £16,000 provided for subsidies

to 13 light aeroplane clubs under existing agreements, £3,000 has been included as an estimate of the payments to be made to National Flying Services, Ltd., for capitation grants in respect of pilot members of Flying Clubs affiliated to that company. The scheme is essentially one of payment by results, and the conditions governing these grants were explained in the White Paper (Cmd. 3264) recently laid before the House. They include a stipulation that the company's activities shall result in the establishment, within three years, of 20 aerodromes and 80 landing grounds, the provision of which will be of great value to civil aviation and to the Royal Air Force.

The work of reconstructing Croydon Aerodrome will be completed during the current year, at an estimated expenditure of a further sum of £7,000, representing a saving of £12,000 on the total estimate for the work. A further reduction in capital outlay results from the completion, during the past year, of the purchase of part of the Waddon Factory buildings adjacent to Croydon Aerodrome.

In connection with the Aeronautical Exhibition to be held at Olympia in July next, the only exhibition of its kind to be held in this country since 1920, provision has been made for an expenditure of £7,000, in order to enable the Air Ministry to organise a suitable exhibit.

Meteorology.—The meteorological investigations which have been carried out and are being continued in connection with problems arising out of the airship development programme promise to give results of general scientific value. In particular, a set of weather charts has been drawn in greater detail and for a wider area of the Northern Hemisphere than has been previously attempted, and provides valuable material for furthering the study of the influences controlling the weather of Europe, Asia, and North Africa.

Active co-operation with the meteorological services of the Dominions has been fostered by airship and aviation requirements. A conference in London with the Director of the Canadian Meteorological Office has supplemented the work done by the meteorological member of the airship mission to South Africa, Australia, New Zealand, Ceylon and India in 1927, and arrangements have been made to carry co-operation a stage further by means of a conference of Empire meteorologists to be held in London during the coming summer, at which it is anticipated that many Crown Colonies will be represented in addition to the Dominions.

Air Ministry.—A rise in Vote 10 (Air Ministry) due to annual increments of pay on approved scales has again been largely offset by administrative economies.

A reorganisation and decentralisation of the work of the Directorate of Works and Buildings are being undertaken which will reduce the charge to this Vote, but against the reduction thus effected has to be set an increase due to the transfer of certain outstation technical staff to headquarters where their work can be more efficiently performed.

NEW YEAR HONOURS

THE New Year Honours list, delayed owing to the illness of His Majesty the King, was issued on February 28. The list includes:—

Knight

Alliott Verdon Roe, O.B.E. For distinguished services to British aviation.

Order of the British Empire

G.B.E. (Military Division)

Air Vice-Marshal Sir Philip Woolcott Game, K.C.B., D.S.O.

M.B.E. (Civil Division)

Charles Pennycock Robertson, Head of Press Section, Air Ministry.

At St. James's Palace

At the Levée held on February 26, at St. James's Palace, by H.R.H. The Prince of Wales, on behalf of His Majesty the King, the following were amongst those presented to the Prince of Wales:—Sqn.-Ldr. F. Alford, M.C.; Group-Capt. G. Bromet, D.S.O., O.B.E.; Flight-Lieut. J. Colquhoun, Flight-Lieut. R. Divers, M.B.E.; Flight-Lieut. D. Don; Sqn.-Ldr. W. Green, M.C.; Sqn.-Ldr. J. Cole-Hamilton; Flight-Lieut. J. Hawtrey; Sqn.-Ldr. P. Hunter; Air Vice-Marshal C. Lambe, C.B., C.M.G., D.S.O.; Flight-Lieut. G. Martyn, Sqn.-Ldr. A. Orlebar, A.F.C.;

Royal Red Cross, 1st Class

Miss Marion Welch, Matron, Princess Mary's Royal Air Force Nursing Service, in recognition of the exceptional devotion and competency displayed by her in the nursing and care of the sick in Air Force Hospitals at Home and in Iraq.

Air Force Cross

Sqd.-Ldr. Edward James Poynter Burling, D.S.C., D.F.C.;
Sqd.-Ldr. Gerald Edward Livock, D.F.C.;
Flight-Lieut. Sydney Leo Gregory Pope, D.F.C.;
Flight-Lieut. Clifford Westly Busk, M.C.;
Flying Officer Edward Hedley Fielden.

Air Force Medal

Flight-Sergt. Herbert John Coppin (155159).
Corpl. Thomas William Penny Jeffrey (344812).

Wing Commander F. Robinson, D.S.O., M.C., D.F.C.; Air Chief Marshal Sir John Salmond, K.C.B., C.M.G., C.V.O., D.S.O., A.D.C.; Air Vice-Marshal F. Scarlett, C.B., D.S.O.; Flight-Lieut. C. Steele, D.F.C.; Flight-Lieut. W. Swann; Flight-Lieut. P. Warburton, M.B.E.; Sqn.-Ldr. G. Williams; Sqn.-Ldr. A. Williams; Flight-Lieut. O. Worsley, etc. Also present were: Sir Samuel Hoare, Secretary of State for Air; Marshal of the Royal Air Force Sir Hugh Trenchard, Bt.; Group-Capt. R. P. Ross, Aide-de-Camp in Waiting; Sqn.-Ldr. A. Kubita; General R. Verduzio; Lieut. de Vaisseau Sala, etc.

EDDIES

SINCERE congratulations to "Crazy-Flying" Sqdr.-Ldr. J. Noakes, upon his complete recovery and resumption of flying after his unfortunate mishap at Martlesham last year during the test of a new machine.

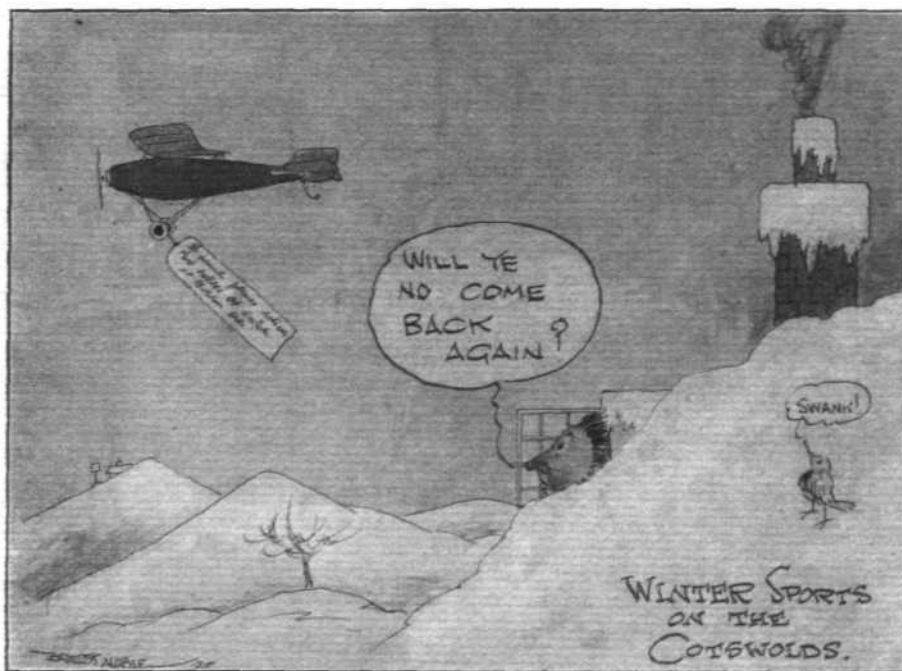
COLONEL LINDBERGH's popularity is still ascending, judging by a report that the Mexican Government, fearing that he might be kidnapped by bandits, has provided a strong military escort to accompany him, his fiancée and her father when they indulge in a week-end visit from Mexico City to Mr. Morrow's country house at Cuernavaca. But the question arises: Which Government is it?

"At Christmas, 1916, I was with a squadron of aeroplanes in the Vosges. The Germans had just captured a British captain in the same circumstances as Capt. Fryatt was taken, and they had condemned him to be shot.

"I got orders direct from the Admiralty to load up all machines and be ready to go over the nearest German town and bomb men, women and children if the execution was carried out. Those orders from the Admiralty were allowed to leak out in Berlin. The man was not shot, but he would have been if we had not been ready to carry out the threat."

Thus Lord Halsbury, at a League of Nations Union meeting the other day, when emphasising the fact that to protect civil populations from attack from the air we had to be strong enough to threaten reprisals. Such a moral lesson as the above should silence once and for all the petty quibblers who have nothing better to put forward than "Don't hurt your enemy."

A TYPICAL postcard from an old artist contributor to FLIGHT, in which the little "flyer" which the snowed-in artist has launched from the Cotswold Hills conveys its own commentary on the recent arctic weather, its label request



reading "If found please deliver a brace of Scotch, etc.," and incidentally depicts one of the latest clever "Zephyr" models which stand to the credit of that Oxford Street model enthusiast, Mr. A. E. Jones.

WHERE the sun has been shining. The pilot of a Handley-Page-Napier air liner which made Croydon from Cologne last Saturday, reported that during the whole of the journey he was flying in brilliant sunshine, not a single cloud being seen during the 325 miles' flight.

ANOTHER aspirant for flying:—

Flying.—A writer in the Mechanics' Magazine announces that he has succeeded in constructing an apparatus for flying, far exceeding in strength and lightness, anything produced by nature, and offers to dispose of a fourth share in the profits of a discovery so important for £1,500.

It might be well to note, however, that the above is a paragraph which appeared on March 1, 1829, in our contemporary the Observer.

THE much-discussed case of the Hon. Violet Douglas-Pennant, who was dismissed from the post of Commandant of the W.R.A.F. in 1918, is, I hear, likely to be reopened shortly, by reason of fresh evidence which it is stated has reached the hands of the Petition Committee since the issue of the findings of the Select Committee appointed to go into the case by the House of Lords in 1919. The House of Lords is being asked again to open a further enquiry.

A BIG demand is foretold for the latest road abortion in the form of a 14-wheeled motor lorry to carry 100 tons! Just fancy this contraption careering along His Majesty's highways without a speed limit in force! One comfort is that by the time a few thousand of these Juggernauts are on the road most folk will be taking to the air as the only safe element in which to gyrate.

ANOTHER enlightened Education Committee—the Glamorgan—has made itself conspicuous by deciding that none of the students under their control shall be nominated for apprenticeship in training for the R.A.F., in like manner to a ban which they had previously placed on the other fighting services, the idea being that they should not nominate any boy for training in the destruction of human life. All of which is quite good for the Glamorgan Committee, but I am just wondering what opinion they would hold individually should a few of them happen in some city when the inevitable poison gas bombers arrive. It may then dawn upon them that prevention would certainly have been better than calmly taking the medicine provided by those who differ with us.

VERY remarkable in disclosing ancient camps and cities are the results of photography from the air, the sites of which have hitherto been but vaguely known. One of the most recent disclosures in this respect is the scheduled

Roman site of Caistor Camp, some 3 miles from Norwich. It is well that the Air Ministry permit a hand to be taken in this splendid work thus helping forward archaeology.

Now that an official decision has been given regarding the first flight in England by a British subject, it might be as well to note that, according to Mr. R. D. Galbraith, in a letter recently to the press, the *Daily Mail* is acclaimed as "the Father and Mother of aircraft."

THERE is sound commonsense in the views expressed by Major L. V. Stewart Blacker, of the Corps of Guides, in the Journal of the Royal United Services Institution, in regard to mechanised warfare in Asia, in which he gives priority to the Autogiro type of flying machine in the necessary air units of fighting groups of mountain brigades. These machines and armoured cars, he says, could be employed by the Scout Company for close reconnaissance, but at the rear of a brigade a supply flight of four heavy aeroplanes could be used for ammunition and rations. "Air distances in mountain warfare are always very short, hence we may expect both supply aeroplanes and autogiro ambulances to do more than one trip in the day."

In a particularly illuminating vision of the city of the future, Mr. Howard Robertson recently, at the Architectural Association, gave one a good deal to think about. Possibly some of his ideas may appear to be at the moment somewhat far-fetched, but on the whole he should be congratulated upon his very broad views. I am glad, incidentally, to notice that he did not omit to give a word of warning as to the provision for aircraft landing facilities during this remarkable forecast. In his view "the roofs of London, as we see them today, form one vast space; with our steep roofs we lose the opportunity for a magnificent thoroughfare, not to mention their future utility as aircraft landing platforms. The new Charing Cross should be schemed with an eye to its roof being used as a landing-place for air taxis. This station, if carried out, will provide a splendid chance for future needs. Men of wide vision should be consulted before its design is settled."

A GREAT UNDERTAKING

As makers of the widest and most successful range of British aircraft and engines the Armstrong Siddeley Development Co. Ltd. is in a unique position to offer the results of its extensive experience on matters relating to air transport, training, fighting or private flying machines on land or sea in any part of the world.

Brief details of aircraft and machines are given below. Full particulars and prices may be obtained on application.

AIRCRAFT

AIRCRAFT FOR THE SERVICES

The Armstrong Whitworth All-Steel Atlas 2-seater Fighter or reconnaissance machine, fitted with an Armstrong Siddeley Jaguar engine and either wheels or floats.

The Armstrong Whitworth All-Steel Siskin 3.A. single seater Fighter fitted with an Armstrong Siddeley Jaguar engine.

The All-Steel A.W.A. 14 high performance Fighter fitted with an Armstrong Siddeley Jaguar engine.

AIRCRAFT FOR CIVIL PURPOSES

The Armstrong Whitworth Argosy. A 20-seater Airliner fitted with three Armstrong Siddeley Jaguar engines.

The Avro Commercial Monoplanes. A 4-5 seater or 8-10 seater both fitted with three Armstrong Siddeley engines.

The Avro-Avian. A 2-seater light aeroplane fitted with Cirrus or Armstrong Siddeley Genet engine and either wheels or floats.

AIRCRAFT FOR SCHOOL & CLUB PURPOSES

The Avro Gosport, fitted with Armstrong Siddeley Mongoose engine and either wheels or floats.

The Avro 504.N. fitted with Armstrong Siddeley Lynx engine and either wheels or floats.

The Avro-Avian, fitted with Cirrus or Armstrong Siddeley Genet engine and either wheels or floats.

ENGINES

THE LEOPARD

The Armstrong Siddeley 700-750 h.p. 14-cylinder Leopard for civilian use or for carrying troops or torpedoes.

THE JAGUAR

The Armstrong Siddeley 460-500 h.p. 14-cylinder Geared Jaguar for Civil or Service requirements. Jaguar engines have been in service on the London-Paris Airway for over three years.

The Supercharged 14-cylinder Jaguar is specially designed for maintaining power at high altitude.

Note.—The Armstrong Siddeley Geared Centrifugal Supercharger was the first device of its kind supplied to the British Government and has now been in use for three years.

THE LYNX

The Armstrong Siddeley 230 h.p. 7-cylinder Lynx as used on the Amsterdam-Batavia, Munich-Milan and other airways.

THE MONGOOSE

The Armstrong Siddeley 130-140 h.p. 5-cylinder Mongoose engine for training work on land or sea.

THE GENET

The Armstrong Siddeley 80-88 h.p. 5-cylinder Genet, an engine which is very much lighter than any engine in its class and is, therefore, particularly suitable for powering light aircraft.

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT LIMITED.
Works & Aerodrome: Whitley, Coventry. London: 10 Old Bond Street, W.1

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A. V. ROE & COMPANY LIMITED,
Newton Heath, Manchester
and 166 Piccadilly,
London, W.1.

THE AVRO TEN

A Three Engined Commercial Monoplane

The Avro Ten is a British version of the Fokker F.VII-3m., built under licence from the Fokker Company (N. V. Nederlandsche Vliegtuigenfabriek).

It carries eight passengers and is fitted with three 230 h.p. air-cooled Armstrong Siddeley Lynx engines.

Monoplanes of this type have attained a world-wide reputation for reliability, ease of maintenance and economy of running—qualities that have been proved during a period of several years.

They are used by the principal Dutch, Swiss and Italian Airlines.

Leading Features

ENDURANCE. 4 or 6 hours according to fuel capacity at a cruising speed of 96 m.p.h. with normal full load.

CONTROL. Complete dual control with side-by-side seating for pilots. Tail trimming gear allows large variation in the position of the centre of gravity.

CABIN. Dimensions 10' x 5' x 6' with seats for eight passengers. Broad windows with wide angle views. Large door and direct access by fixed step.

BAGGAGE. Three compartments, total capacity 114 cubic feet.

FUSELAGE. Tubular steel with welded joints braced with steel struts and high tensile steel wire. Covered with fabric.

UNDERCARRIAGE. Special design of simple construction providing wide track. Rubber shock absorbers with special method of adjustment.

ENGINE MOUNTING. Of simple design permitting quick removal.

TANKS. Oil tanks fitted behind engines, fuel tanks fitted in wing providing simple gravity feed. Capacity with two tanks 150 gallons. With three tanks 225 gallons.

WING. Single unit of cantilever construction. Built of wood and covered with plywood to facilitate maintenance.

A. V. ROE & COMPANY, LIMITED
MANCHESTER

THE LYNX ENGINE

A 7 Cylinder Air-Cooled Radial

The 230 h.p. Armstrong Siddeley Lynx engine has attained a world-wide reputation for reliability and ease of maintenance.

It was with Lynx engines that Lieut. Koppen flew his Fokker F.VII-3m. from Amsterdam to Batavia and back, covering 18,000 miles in 18 days. It was with Lynx engines that Fokker machines repeated the Amsterdam-Batavia flight with equal reliability last summer, and it was with Lynx engines that the difficult Munich-Milan Italian Airline and two new Airlines in Switzerland were equipped.

Lynx engines are used in more than twenty different countries, where their independence of climatic conditions have been amply proved. They have been used with equal success in Central Africa and within the Arctic Circle.

Fitted on Avro Aircraft they are the standard training engine of the British Air Force and are widely used for seaplane training. They are also used for two-seater reconnaissance machines, single-seater fighter aircraft, deck-landing aircraft and twin-engined seaplanes.

Many of their principal parts are interchangeable with those of the Armstrong Siddeley 14-cylinder Jaguar and 5-cylinder Mongoose engines. Where different types are in service this effects great economy in the storage of spares and general maintenance.

Leading Features

7 cylinders, 5" bore \times 5.5" stroke.

Compression ratio 5 to 1.

Normal r.p.m. 1,900. Maximum r.p.m. 2,090.

Engine weight 513 lbs.

Direction of rotation, Left Hand Tractor.

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A
REMARKABLE
PERFORMANCE

The Armstrong Siddeley Jaguar engines
used by Imperial Airways Limited on
the Argosies flying between London and
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between overhauls, the usual
top overhauls having
been discontinued
altogether.

This achievement is claimed as a record of
endurance, unsurpassed by any other engine
in the world.

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COVENTRY

In this respect it can hardly be disguised that a magnificent opportunity has been missed in the reconstruction of Regent Street.

POSSIBLY the following excerpt from the *Observer* of February 22, 1829, just a hundred years ago, may bring home very vividly to the present generation the progress which has been made in speed during the past century:—

Locomotive Engine.—On Friday week the new locomotive engine, belonging to the Bolton and Leigh Railway Company, christened the Lancashire Witch, descended the inclined plane to the Bolton coal depot, moving at the rate of 8 m.p.h., with eight loaded wagons attached. The engine then ascended the inclined plane, a mile in length, one-half of which ascends nearly an inch in a yard. On this part the engine travelled at the rate of 6 m.p.h. The result far exceeded the expectation of the engineer.

I WAS greatly interested by an article on "British Air Posts" which appears in the January number of *The Air Post Collector*—a useful little monthly published by R. E. R. Dalwick, of Dorking, specially for that new and rapidly growing species of humans implied in its title. This article, which I gather is written by Douglas B. Armstrong, whose name is familiar to readers of *FLIGHT*, gives particulars of the various early air mail efforts carried out in Great Britain—some of which, no doubt, many of us have either forgotten or have never even heard of. They include the "Daily Graphic Balloon post of 1907, the Blackpool-Southport experiment of 1910, the "Daily Mail" air posts of 1912, and the London-Windsor-London air posts of 1911. The details of the latter are most interesting, especially as regards the prices—the highest, £15, being quoted for the Royal Purple London-Windsor card with postmark No. 2.

SIR CHARLES WAKEFIELD, at the Lyceum Club gathering the other night, once again entered the lists as a prophet, Sir Charles expressing the belief (and probably hope) that the Schneider Cup would one day be won by a woman aviator—and, if so, 10 to 1 the honour would fall to a British airwoman. What a scene would cap such a happening.

Ontario's Forest Patrol

THE HON. WILLIAM FINLAYSON, Minister of Lands and Forests of Ontario, discussing the work of the Forestry Patrol Service of the Province, claims that Ontario's efforts to cope with the forest fire menace are now meeting with unqualified success. In the older section of the forest area, some 25,000,000

"THE Guild of Air Pilots and Air Navigators of the British Empire" is the excellent title now chosen by the pilots and air navigators in this country for the formation of an aviation body similar to the Company of Master Mariners. May a full measure of success follow this very important departure.

Is it a dream only or will time, backed by modern science and enterprise, bring into actuality the great Atlantic "Seadrome" scheme now seriously put forward by Mr. Henry J. Gielow, of the Incorporated New York Naval Architects, consulting architects to the Armstrong Seadrome Development Co., of Wilmington, Delaware. The first of nine of these great seadromes (to be "buoyed" about 300 miles out between New York and Bermuda), is to be constructed forthwith, the full set forming a "chain" to Europe via the Azores. Each "island" consisting of a steel platform, will be 1,200 ft. by 200 ft. wide at the end, and 400 ft. at the centre, with a "top" some 100 ft. above the ocean. Each float will be manned by a crew of 43 men, and be equipped with a machine shop, hotel, restaurant, and wireless beacon. Naval engineers declare that the floats will ride any waves up to 180 ft. in height with practically no motion. They will be anchored in place with great chains 21,000 ft. long attached to specially designed sea anchors. It is a great undertaking. May it succeed.

AVIATION already, whilst still in its early youth, has amassed its mead of slang, but although a goodly number of its pet phrases have been recorded at various times, it will take a few decades before such a bulky little volume can be got together as "Sea Slang," just issued by Messrs. Sampson Low, Marston Co., Ltd., compiled by Frank C. Bowen, in alphabetical order and priced at the modest figure of 3s. 6d. Its 154 pages are something to be wondered at, with some 16 to 20 old-timers' expressions and epithets, with explanatory text to each, on each page—ranging from "A-Cock-Bill" to "Zopissa." And even then the compiler modestly states that the book "is not by any means complete, and as yet only touches on the fringe of the subject"! Yes, it will be some little while before aviation "slang," expressive as it is, can hope to surpass "Sea Slang."

acres are under hourly supervision through the system of watch towers, and 100,000,000 acres are under daily observation by means of the aeroplane patrol system. In 1923, he stated, when the present service was organised, 2,100,000 acres of timber were burned. In 1927 the area had been reduced to 35,000 acres.



The Esher Efficiency Trophy:
 Sir Samuel Hoare
 awarding the
 Trophy, presented
 by Viscount
 Esher, to Lt.-
 Lieut. S. B. Collett
 on behalf of
 No. 601 Sq.
 (County of London)
 Auxiliary
 Air Force.

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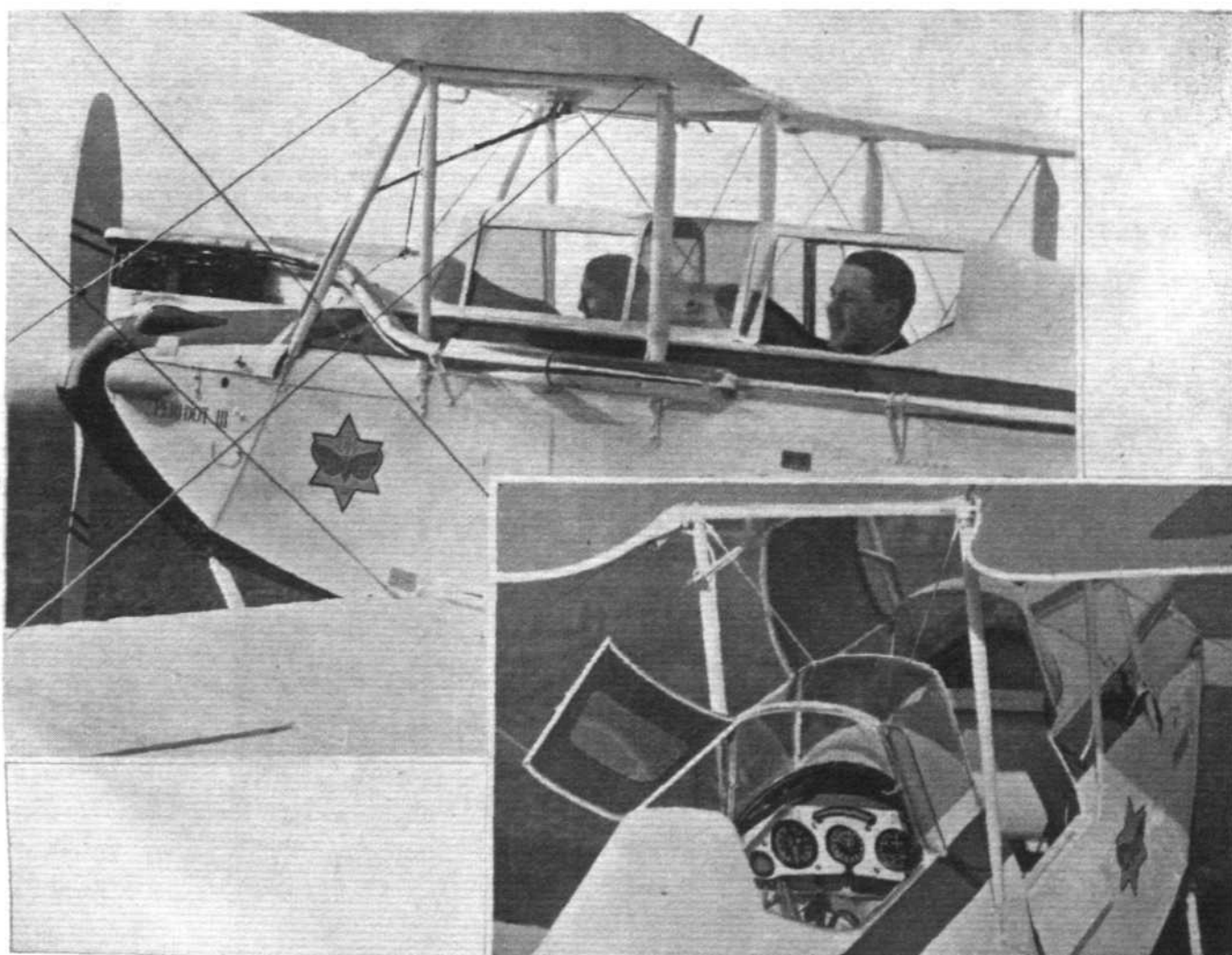
A Super Gipsy-Moth

It is in the natural order of events in the development of private owners' aircraft that luxury in comfort and appearance should be introduced. There has been, of course, a superficial attractiveness and a cosiness from the beginning, but essentially the first considerations have been for the performance, reliability and price. Important improvements like a safe reserve of power, without additional engine weight or frontal area, and an economical fuel consumption, have mainly occupied our designers first, and been achieved. And what is most significant of all, these achievements have been passed to the advantage of private owners without any increase in price; in fact, quite the reverse.

Even supposing the prices had not been brought down from their original level, light aeroplanes would be relatively cheaper than when first produced, by virtue of these sound improvements. Although subsidiary, the attractiveness and comfort of private aircraft are none the less of certain importance. It is the superficial quality of an object that first attracts us, and with many people it is even that which decides their purchase. Clean lines and a harmonious colour scheme are usually tried for in aircraft, and they are two

features which can be in discord or react with good mutual effect. Discriminate choice of colour and the style applied can emphasise existing good fairing lines, as many examples show to-day, but on the other hand, a lack of taste can conceal gracefulness and symmetry, just as the bizarre, exotic splash of colours on the sides of our ships during the war intentionally mutilated their outlines, so that they were not traced clear-cut upon the horizon, or against the ocean surface.

The variety of zig-zagged stripes across the ships' plates suggested that huge chunks had been hewn out of the top lines of the sides, and conspired to conceal the nature of the object at a distance. Incidentally, the illusions that that treatment created differed for the seaplane observer and surface observer. From the level, the camouflage achieved some uniformity with the hues and tones of the ocean, but from above the ocean had toned down to one monotonous, predominant shade, such as grey or blue, and the striped sides of the ships became a vivid contrast. Yet that did not necessarily mean that a ship was far easier to observe from a seaplane. The very eminence of a flying position brought



Above is Mr. Morris Jackaman and his sister in his new luxurious Coupé Gipsy-Moth, and below is a view of the neat white interior of the cockpits, where green upholstery has also been adopted, and heat is directed inside from the exhausts.

[“FLIGHT” Photographs]



["FLIGHT" Photograph]

Mr. Morris Jackaman's new Coupé Gipsy-Moth which has been supplied to him by Airwork, Ltd., Heston, Middlesex. It has been attractively decorated and daintily equipped, becoming the "last word" in private aircraft.

such measureless space into being when visibility was good that it concealed an infinity of detail which the human eye could not immediately encompass.

Gipsy-Moth de Luxe

The smallness of the light aeroplane cockpit has not made it as obtrusive to the eye as the inside of a car, but with the introduction of the coupé, one becomes more aware of the interior and the desire of it having more appeal to the eye and comfort for the body. The De Havilland Aircraft Co., Ltd., have produced a Gipsy-Moth in luxurious style to the order of that experienced private owner, Mr. Morris Jackaman. He took delivery of it last week-end, through Airwork, Ltd., of Heston Aerodrome, Middlesex, who will no doubt figure largely in the supply of light aeroplanes to private owners in the future as a part of their aerodrome business.

Mr. Jackaman has had the many features which figured on his previous machines included in the new machine, and such additional improvements as his air experience has advised. "Peridot III," as he names it, retains the original colours of white and green, but chromium plating for the exhaust pipe and manifold has been applied, whilst a bright lacquer finishes off the streamline wires. There is considered to be a practical significance in this colouring, because a brilliant, vivid colour scheme is some safeguard against collision above a busy aerodrome; further, chromium plating is more resistant to corrosion than any other finishing process. The cowling round the D.H. Gipsy engine is buffed and curled and finished with a transparent lacquer to avoid the necessity

for frequent polishing, whilst the wooden propeller is white, with a green spinner.

A silver dope and white edging gives the wings their gild, and green has been selected for the registration letters. White gives a clean and light effect in the cockpits, a colour for this purpose which could well be standardised, because when flying in the dusk or in black clouds, it is possible, in a white cockpit, to read a map and read instruments, which a darker colour would make impossible.

Cockpit lighting and navigation lights are also installed for night flying, and on a white cellulosed dashboard there are standard instruments, a clock, oil temperature thermometer, and Kygas doper pump, which facilitates clean and quick engine starting. A Hughes Midget compass is fitted in the usual position. Green leather upholstery also dresses the interior of the cockpits, and the pilot's control column has a green spade-grip. The coupé design protects both occupants from the weather, of course, but also, in Mr. Jackaman's machine, heating is provided from the exhausts.

An extra petrol tank, allowing greater endurance capacity, has been installed in the front cockpit without causing discomfort to the passenger, whilst above it is a shelf for maps and gloves, etc. The Vickers pump for filling the gravity tank is conveniently situated for the pilot's right hand. Handley Page automatic slots are fitted.

More space has been gained in the back luggage locker by making it 3 in. deeper than standard dimension, whilst there is also a very useful long locker inside the fairing behind the pilot's head for long, narrow objects.

New Zealand Notes

NEW ZEALAND aviation is going ahead rapidly at the present moment, after a long period of rather regrettable apathy. This is mainly due, no doubt, to the enormous interest taken by the public in the successful flight from Sydney to Christchurch of the *Southern Cross*, Capt. Kingsford-Smith's 'plane being the first to cross the Tasman Sea.

Aero Clubs, similar to those in England, have been formed at Auckland, Christchurch, Blenheim, Napier, Hawera, Hamilton, Wellington, Ashburton, and Dunedin, although some of these are still without machines. The Government has allocated two light 'planes to the Auckland Club, and two to the Christchurch Club. The Auckland Club has also been presented with a machine by Messrs. Wilson and Norton, newspaper proprietors, to mark the successful trans-Tasman flight of the *Southern Cross*. It is expected that the 'plane given to the Dominion by Sir Charles Wakefield as a stimulus to aviation will go to the Blenheim Club.

The clubs which have not yet obtained their 'planes are proceeding with the erection of aerodromes and hangars, and the levelling of landing grounds. All the light 'planes ordered are of the latest type, with slotted wings and D.H. Gipsy engines.

Apart from these Aero Clubs, the Government itself is doing good work. The air base at Hobsonville, near Auckland, is nearing completion, and the Wellington air port base at Rongotai is well under way. The Government are awaiting the arrival of a number of 'planes ordered some time ago, but the English makers are so busy with orders that it may be several months before all the machines ordered are landed in the Dominion.

The Minister of Defence has received a very comprehensive report on the question of New Zealand's aerial defence from Sir John Salmond. After consultation with aviation experts, the report will be submitted to the Cabinet, who will decide as to the publication of details.

J. T. C.

BENGAL FLYING CLUB OPENED

British Light 'Planes Chosen

THE Governor of Bengal, Sir Stanley Jackson, opened the Bengal Flying Club in India on February 2, at the Dum-Dum aerodrome. Lady Jackson christened one of the club's Gipsy-Moths after her own name with a bottle of champagne, which refused to break against the spinner in the usual way except after repeated attempts. During the ceremony Capt. Leete tested the machine with Lady Tegart as passenger, whilst the other Gipsy-Moth provided by the Government of India was flown by Mr. F. B. Raynham with Princess Ila Devi, eldest daughter of the Maharanee of Cooch Behar, as his passenger. Then an Avro "Avian," belonging to the Bengal Air Transport Company, was flown and Baron Koenig, who flew to India from Germany last year, took off in his monoplane "Kamerad." The three light aeroplanes flew in formation and performed combined stunts.

Sir Stanley Jackson drove to the club's new headquarters, the Outram Institute, where all the guests enjoyed the hospitality of Sir Rajendra Nath Mookerjee. Sir Stanley declared the club open. These headquarters, which are in the old Bengal Artillery Mess, the first mess, incidentally, which Earl Roberts joined at the beginning of his service in India, include two lounges, dance room, ladies' room and reading room. Two tennis courts are adjacent with space for extensions.

Mr. Justice Costello, the President of the club, said that the light aeroplane club at Delhi held its inaugural ceremony recently, and, he declared, amid laughter, that actually Delhi had pinched their programme and forestalled them. They were indiscreet enough to send Delhi their plans and they had jumped in first and did what they had intended doing.

He said that the light aeroplane clubs had been founded in India with the support of the Government to foster civil aviation. The Bengal Club had been brought into existence by the energies of Mr. Arthur Moore, who was not able to be present, but sent a message wishing the club success, especially in competing for the Wakefield Presentation Plate.

Mr. Justice Costello said that he hoped the meeting would yield more members, and that rich and public-minded individuals would follow the example of Sir Victor Sassoon and present them with more aeroplanes. The club owed a great deal to Sir Rajendra Nath Mookerjee, too. Sir Stanley Jackson was already a patron, and it was their desire that Lady Jackson should become an honorary member. He therefore asked Her Excellency to accept an enamel and gold brooch which would be an "open sesame" to all future gatherings of the club.

Sir Stanley Jackson, in his speech, said that he regarded the present occasion as of special importance. No great city could afford to be without facilities for aviation. By starting the club, the membership of which was open to all communities, they inaugurated civil aviation in Bengal. It was only right, he continued, that their enterprise should receive the support and encouragement of the Government and he was pleased to know that the Government of India had been able to assist them by placing those grounds at their disposal as well as granting them two Gipsy-Moth aeroplanes. He felt justified in anticipating that within a short time aviation in Bengal would be as popular a sport as it would also prove to be of great commercial and public utility.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W. 1.
Bristol and Wessex Aeroplane Club, Filton, Gloucester. Secretary, Major G. S. Cooper, Filton Aerodrome, Patchway.
Cinque Ports Flying Club, Lympne, Hythe. Hon. Secretary, R. Dallas Brett, 114, High Street, Hythe Kent.
Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.
Lancashire Aero Club, Woodford, Lancs. Secretary, Mr. Atherton, Avro Aerodrome, Woodford.
Liverpool and District Aero Club, Hooton, Cheshire. Hon. Secretary, Capt. Ellis, Hooton Aerodrome.
Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, J. T. Dodes, Cramlington, Northumberland.
Norfolk and Norwich Aero Club, Mousehold, Norwich. Manager, G. McCwen, The Aerodrome, Mousehold, Norwich.
Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., 30, Park Row, Nottingham.
The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, George George Baldwin, Moor Park Aerodrome, Renfrew.
Southern Aero Club, Shoreham, Sussex. Secretary, Miss N. B. Birkett, Shoreham Aerodrome, Sussex.
Suffolk Aeroplane Club, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.
Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

(FEB. 25—MAR. 3.)—Pilot Instructors: Capt. V. H. Baker, M.C., A.F.C.; Capt. F. R. Matthews, Ground Engineers: C. Humphreys and A. E. Mitchell. Aircraft: The following machines were in commission during the week: G-AABL, G-EBXS, G-EBZC, G-EBMP.

Total Flying Time: 51 hrs. 40 mins. Dual Instruction: 27 members received dual instruction during the week, the time being 20 hrs. 25 mins. Solo Flying: 47 members flew solo during the week, the time being 31 hrs. 15 mins.

On February 28, H. Buckingham and H. Kennedy completed the height tests for the "B" Licence. On March 2, T. R. Dixon and S. Hansel passed their qualifying tests for the "A" Licence. On the same day, Capt. The Master of Gray made his first solo flight. On March 3, W. W. Briscoe passed the qualifying tests for the "A" Licence.

Dinner, Dance and Cabaret.—The Dance Committee are to be congratulated on the success attending the dinner, dance and cabaret which was held on Tuesday, February 26. The attendance of 290 members and their friends taxed, somewhat, the accommodation, and the space for dancing was a little overcrowded. In spite of this, however, everyone managed to thoroughly enjoy the evening. Mr. T. Elder Hearn provided an excellent cabaret, which was greatly appreciated.

The two raffles held during the evening realised nearly £60, and the Club's thanks are due to the following who generously provided the various prizes:—British Celanese, Ltd., Lewis's Leather Clothing Manufacturer, Columbia Salons, Ltd., E. B. Meyrowitz, Ltd., Lieut.-Col. Sir F. K. McClean, A.F.C., Capt. F. E. N. St. Barbe, C. R. Fahey.

Capt. H. S. Broad, who won the portable gramophone, has kindly presented it to the club.

BRISTOL & WESSEX AEROPLANE CLUB, LTD.

(FEB. 24—MAR. 2.)—Pilot Instructor: E. B. W. Bartlett. Ground Engineer: A. W. Webb. Machines in Commission: (1) TV. Flying time for the week: 14 hrs. 55 mins. Pupils under instruction: (8) 6 hrs. 35 mins. Soloists under instruction: (1) 20 min. "A" Pilots: (7) 5 hrs. 10 mins. Passengers carried: (6) 5 hrs. 30 mins. Test flights: (5) 30 mins.

Improved weather has at once brought more members to the aerodrome, and but for continuous trouble with magnetos we should have had an excellent week. One machine has been out of action throughout the week through its magnetos, as well as our spare ones, failing for causes at present unknown. Above about 1,600 revs. they have regularly missed, while below 1,600 they have behaved normally, the defect having been detected on the ground.

It is believed that the Club made history this week in having flown a Member of Parliament to his rendezvous for an electioneering address, no previous instance of this being known. On February 27, Lord Apsley flew from Bristol to Truro with our instructor as pilot: the weather was about as bad as could be and it required considerable determination to carry out the flight.

Miss Hawkings and Mr. C. M. Clarke flew for the first time during the week.

We are very grateful to the Air Ministry and our good friend Sir Sefton Branker for permission to continue to use this aerodrome until October 1, before which we intend to have moved to our own aerodrome, the site for which has been selected and approved. It will be even more conveniently situated to the centre of Bristol, and the site is considered in almost every respect to be ideal, and sufficiently large for any purpose.

CINQUE PORTS FLYING CLUB

EASTER meeting assumes International Character. Three entries from Holland. Vice-President's generous gift.

(FEB. 24—MAR. 2.)—Pilot instructor, Maj. H. G. Travers, D.S.C. Ground engineer, Mr. R. H. Wynne. Machines, de H. Moths R.I. and N.N. Total flying time for week, 8 hrs. 10 mins. Dual instruction:—Mr. West, 45 mins.; Mr. Shaw Kennedy, 30 mins.; Mr. Story, 15 mins.; Mr. Parks, 15 mins. Total, 4 members, 1 hr. 45 mins. "A" pilots:—Mr. Somerset, 2 hrs. 45 mins.; Mr. Douglas, 1 hr. 15 mins.; Mr. Armstrong Payn, 1 hr. 15 mins.; Mr. Story, 15 mins. Total, 4 members, 5 hrs. 30 mins. Joyrides, two; 20 mins. Tests, six; 35 mins.

Flying was possible only on Thursday, Friday and Saturday of this week, but there was a notable increase of activity amongst the members on these three days. A new member, Mr. Shaw Kennedy, of London, began tuition on Friday, and is getting on well.

In addition to the above times, Mr. Douglas put in 2 hrs. 40 mins. on his D.H. 53 X.M., including a flight to Manston and back. Mr. Somerset flew to Manston and back in R.I., on Saturday.

Easter Meeting.—Sir Charles Wakefield, Bart., who is a vice-president of the club, has very generously decided to award a silver cup, value 20 guineas, to be competed for at Easter. This cup has been allocated to the Manufacturers' Scratch Race, and will be substituted for the cup, value 10 guineas, originally offered as the first prize in this contest.

It is to be hoped that the English machines will have international competition at this meeting, as we are informed by the Rotterdam Aero Club that they will enter two Pander Light Aeroplanes, fitted with the German Siemens-Halske radial engines. One is the property of Mijneer Vlaming, and will



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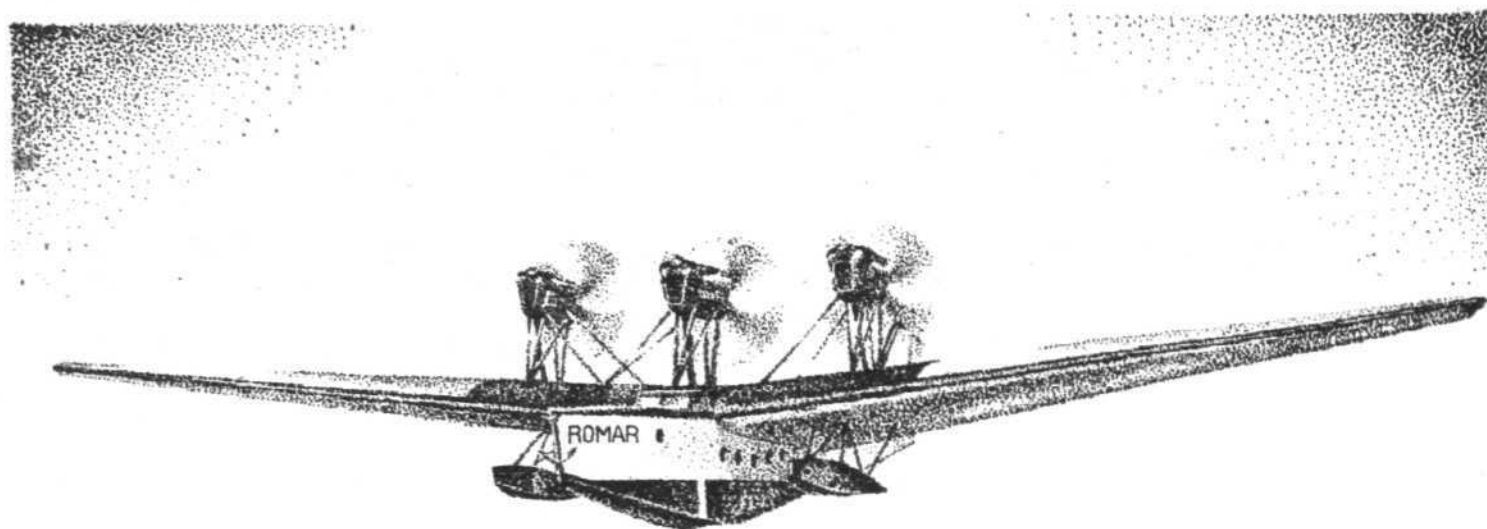
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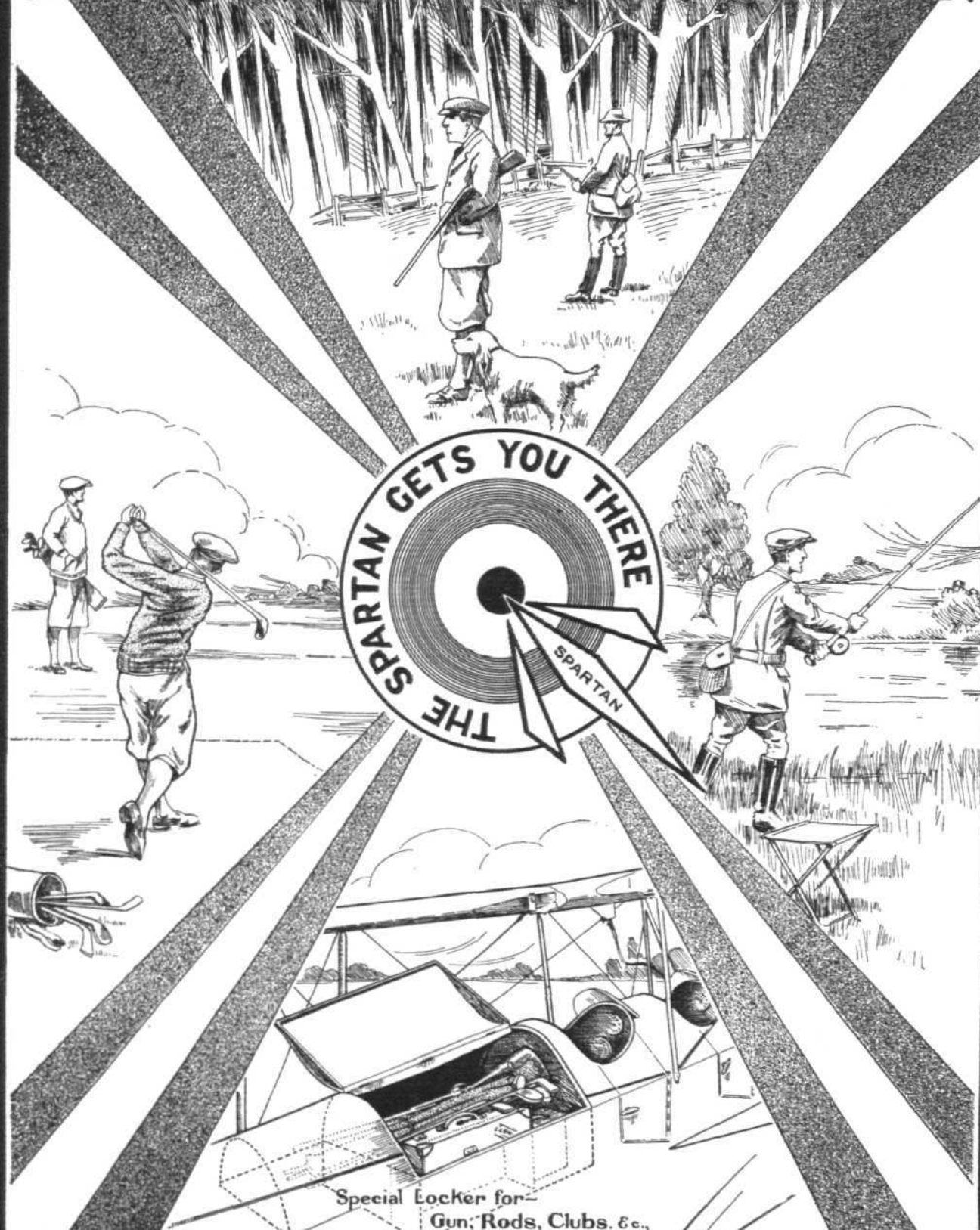


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Baron Friedrich-Karl Freiherr von Koenig Warthausen and the 20 h.p. Klemm-Daimler baby plane in which he made his record flight from Berlin to Karachi, and in which he won the Hindenburg Cup for the best amateur light plane in Germany. After this award the Baron wrote "Allow me to congratulate you once again on your famous CASTROL Oil which I use exclusively in my monoplane."

C. C. WAKEFIELD & CO., LTD.,
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Wakefield House, Cheapside, London, E.C.2.

Karachi (India).
November 14th, 1928.

Dear Sir,

You may be interested to learn that I have undertaken a flight what might be termed the World's first, by a "Baby" plane of only 20 Horse Power.

My first lap was from Berlin to Moscow, a distance of 1800 Kilometres (1118.466 miles) in 14 hours which constitutes a World's long distance record for light planes and this class of plane, and I used your 'Castrol' Oil exclusively to lubricate the twin Cylinder Mercedes-Benz engine.

I have continued my flight to Karachi and have flown together a distance of 8500 Kilometres or 5281.645 miles (Berlin - Karachi) in 16 flying days which included two forced landings on account of unfavourable winds. This flight was carried out under severe conditions of heat, dust, rain and cold, but the engine never let me down once, which bears wonderful testimony to that still more wonderful lubricant—'Castrol' Oil.

My total consumption of Castrol from Berlin to Karachi was only 28½ kilogrammes or 6.98 Imperial gallons.

I congratulate Messrs. C. C. Wakefield & Co. Ltd. and I wish that every amateur aviator who flies a light plane will use only 'Castrol' Oil—the oil that never lets one down.

Yours faithfully,

Friedrich Karl Fch. von Koenig Warthausen

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be flown by him, and the other belongs to the club, and will be flown by its manufacturer, Mijneer Pander. The club also informed us that it is probable that a third Pander will be entered, but details of this machine are not yet to hand.

Intending entrants are reminded that the entry lists close on March 15, and that the Club would be grateful for particulars of visiting aircraft before that date, for inclusion in the programme, even if the aircraft are not entered for any of the competitions.

HAMPSHIRE AEROPLANE CLUB

(FEB. 24-MAR. 2).—Pilot instructors: Flt.-Lt. F. A. Swoffer, M.B.E., and Mr. W. H. Dudley. Ground engineers: Mr. E. Lenny and Mr. J. Elliott. Aircraft, D.H. 60 Moth G-BOH and Avro Avian G-FBVI. Flying time for the week, 14 hrs. 15 mins. Pupils under instruction (12), 8 hrs. 35 mins. Soloist (1), 45 mins. "A" pilots (6), 3 hrs. 10 mins. Instructors, solo and tests (7), 1 hr. 45 mins.

The club held its Annual General Meeting last Wednesday. The chairman, Cdr. Tower, presided, and the proceedings lasted little more than an hour.

One member completed his tests for, and obtained, his "A" licence. The first one this year.

The Avian has returned and the undercarriage should be very popular; it seems to stand a vertical landing from about 200 ft. Members are not recommended to try it, however, as the Chief Instructor's nerves are not as strong as the undercarriage.

The cold weather seems to have kept members away, but they are coming along more frequently now.

LANCASHIRE AERO CLUB

(FEB. 24-MAR. 2).—Flying time, 19 hrs. 55 mins. Instruction (8), 5 hrs. 5 mins.; solo flights (12), 9 hrs. 20 mins.; passenger (13), 3 hrs. 45 mins.; tests (12), 1 hr. 45 mins.

Instructors: With Mr. Hall—Messrs. Russell, R. G. Davies, Williamson, Garner, Stern, Goss, Williams. With Mr. Cantrill—Mr. Ruddy. Machines in commission: XD, MQ, EC, QL. Soloists (under instruction): Messrs. R. G. Davies and Garner.

Pilots: Messrs. Lacayo, Meads, Gort, Michelson, Ruddy, Twemlow, D. Nelson, Goodfellow, R. F. Hall, Williams.

Passengers: With Mr. Cantrill—Mr. Todd. With Mr. R. F. Hall—Messrs. Hoyle, G. P. Williamson, and Wilkinson. With Mr. Meads—Mr. Goss. With Mr. Lacayo—Messrs. Goss, G. K. Benson, A. Liveing. With Mr. Twemlow—Mr. Gort. With Mr. Gort—Messrs. Kelly, Nicholson, Mercer, Williams, Wilkinson.

LIVERPOOL & DISTRICT AERO CLUB

(FEB. 24-MAR. 2).—Machines in commission: Avro Avians XX, XY, WK. Instructor: Flight-Lieut. J. B. Allan. Ground engineer: Mr. Howard Pixton. Total flying time, 12 hrs. 45 mins. Pupils: dual (11), 7 hrs. 35 mins.; solo (1), 30 mins. "A" pilots (6), 3 hrs. 25 mins. Passenger flights (5), 50 mins.; test flights (5), 25 mins.

On Thursday Mr. Williamson flew XY back from A. V. Roe and Co., Woodford Aerodrome, Manchester. XY is now fitted with a Mark IV type undercarriage and looks very smart after her reconstruction.

MIDLAND AERO CLUB

(FEB. 24-MAR. 2).—Total flying time, 24 hrs. 27 mins. Dual, 10 hrs. 25 mins.; solo, 8 hrs.; passenger, 5 hrs. 20 mins.; test, 42 mins.

The following members were given dual instruction by Flight-Lieut. T. Rose, D.F.C., and Mr. W. H. Sutcliffe: J. H. Stevens, J. N. Fisher, F. D. Scott, H. C. M. Shaw, T. W. Wild, L. V. Mann, Mrs. Leigh Fernor, M. Blakeway.

Advanced dual: C. W. R. Gleeson, R. G. Cazalet, G. Savage.

"A" pilots: E. P. Lane, R. L. Jackson, S. H. Smith, R. D. Bednell, H. J. Willis, M. A. Murtagh, W. M. Morris, G. Robson, G. V. Perry, J. Cobb, E. D. Wynn, R. C. Baxter, G. Savage.

Soloists: W. L. Handley, J. K. Morton, F. D. Scott, H. C. M. Shaw, L. V. Mann.

Passengers: E. Skuce, L. V. Mann, Miss M. Pryce, A. Methley, D. Crellin, R. A. Aspinall, A. Corbyn-Hale, J. N. Fisher, D. R. Tullis, O. W. Banwell, E. Hanson, N. R. Greathead, H. Beamish, Miss M. Brinton.

On Saturday Mr. F. D. Scott passed the flying tests for his "A" licence, and Mr. H. C. M. Shaw successfully made his first solo.

The total flying time for February was 90 hrs. 9 mins.; 241 flights.

NEWCASTLE-UPON-TYNE AERO CLUB

(FEB. 18-MAR. 3).—Instructor: G. M. S. Kemp. Ground engineer: K. C. Brown; assistant: J. Tait. Aircraft (3): PT, QV, LX. Flying time for two weeks, 26 hrs. 35 mins. Instruction (6), 3 hrs. 15 mins.; "A" pilots (12), 13 hrs. 40 mins.; solo training (1), 5 hrs.; passengers (10), 8 hrs. 55 mins.; tests (4), 40 mins.

Our flying time has again improved, thanks to a fine day yesterday, when we held another landing competition, the first of a series of three. Mr. C. Thompson heads the list on points obtained and put up a very good show.

Mr. F. Cook was launched yesterday and made an excellent performance.

Mr. Will Hay, who has recently returned from South Africa, paid us a visit during the week and flew one of the club machines. His pictures and news of the South African aero clubs were much appreciated by all our members who had the pleasure of meeting him.

NORFOLK & NORWICH AERO CLUB

(FEB. 25-MAR. 3).—Instructor: J. C. Houston, M.C. Engineer: A. Kirby. Machines: Three (Z.W., Q.X., X.E.). Flying time for week, 18 hrs. 55 mins.; dual, 3 hrs. 15 mins.; solo training, 10 mins.; "A" pilots, 13 hrs.; tests, 25 mins.; passenger, 2 hrs. 5 mins.

Six new members joined the club during the last week, and one Associate member transferred and commenced instruction.

We recently laid in a stock of various spares, but, as usual, it is always the little thing which has not been thought of as essential that goes first. An impulse starter went phut on Saturday, and although one was ordered immediately it spoilt the formation flight arranged for on the Sunday. Mr. "G. E." Kirby carefully studied all the functioning parts of his motor bike in the endeavour to fix things up, but somehow or other they go the wrong way round. The machine was in commission again on the Sunday afternoon. (Moral: an impulse starter deserves to be kept in stock.)

Our members are keen on cross-country flights, and one has been arranged for next Sunday morning.

We are extremely grateful to several members who have subscribed to a compass fund, which will enable us to purchase and fit new compasses in each machine. These have been badly needed for some time.

What we want now is a spare engine. Thus we have another S.O.S. message to send out.

NOTTINGHAM AERO CLUB

(JAN. 1-FEB. 28).—Pilot Instructor: K. K. Brown. Ground engineer: L. H. Harley.

Hon. Secretary: Cecil R. Sands, A.C.A., 30, Park Row, Nottingham. All communications should be addressed to the secretary—please note change of address.

The Club, whose tenancy of Hucknall Aerodrome under the Air Ministry expired on December 31 last, was successful in obtaining temporary accommodation at Ruddington, but owing to subsequent difficulties was unable to make this aerodrome its temporary quarters pending the development of the Tollerton Scheme.

Representations having been made by Sir Albert Ball, the Acting Vice-President to H.M. Secretary of State for Air, the club has now been granted permission to fly at Hucknall for a further short period, and accordingly will be in occupation there on March 1.

The following is a report of the flying done by the club since December 31: Aircraft in Commission, D.H.60X.G-AABA. Dual, 22 hrs. 25 mins.; solo, "A" licence pilots, 17 hrs. 10 mins.; solo pilots under instruction, 5 hrs. 45 mins.; tests and passenger flights, 9 hrs. 10 mins.

SOUTHERN AERO CLUB

(FEB. 25-MAR. 3).—We have had quite a busy week, despite the cold weather, and many members, both of the dual and solo species, came out to fly.

On Sunday, Sir Sefton Brancker, Sir Alan and Lady Cobham visited us, their visit unfortunately coinciding with a lull in the flying activities during the afternoon on account of a burst tyre sustained by G-EBYS while taxiing.

We were also visited by Capt. Malcolm Black, who recently flew Mr. Carbery's Fokker back from Kenya.

Much interest is displayed in the Viper-engined S.E.5A, which was flown for a brief period on Sunday.

SUFFOLK & EASTERN COUNTIES AEROPLANE CLUB

(FEB. 24-MAR. 2).—Instructor: G. E. Lowdell, A.F.M. Ground engineer: E. Mayhew. Aircraft: Three Blackburn "Bluebirds," RE, UH and SZ. Aerodromes: Hadleigh, Suffolk, and Conington, Cambs. Seaplane base: Brightlingsea, Essex. Total flying time: 3 hrs. 30 mins.

Suffolk Aero Club.—Flying time: 3 hrs. 30 mins. One member had dual instruction (3 mins.). Flights were made by 5 "A and B" licence members (2 hrs. 40 mins.). One passenger was carried (5 mins.); 3 tests were made (15 mins.).

Weather only permitted flying on part of two days during the period. In order to popularise flying among the youth of the nation we have introduced at Hadleigh and Conington a course of flying on easy terms. For a first payment of £4 10s., and six further monthly payments of £4 10s., we offer a six months' course of instruction in flying. This course of two lessons a week, with a maximum of 52 lessons, may be started immediately upon making the first payment. The payments include entrance fee and subscription as a member of the club for one year, the cost of the "A" licence, and flying facilities at two aerodromes: Hadleigh and Conington. Further particulars may be obtained from the secretary.

Cambridge Aero Club.—Weather prevented flying. The organisation of the Cambridge Air Display to be held at Conington on Easter Monday is progressing apace. There will be four competitive events for visiting pilots. Our event is on Monday, and the Lympe meeting is on Friday and Saturday. We are taking part in the Lympe event and trust that the Cinque Ports Club will also support us under a similar arrangement as last year, when all the machines from Lympe came on to our Easter Meeting at Hadleigh, thus making the two meetings complimentary.

YORKSHIRE AEROPLANE CLUB

(FEB. 24-MAR. 2).—Pilot instructor: Flt.-Lt. H. V. Worrall. Ground engineer: R. Morris. Machines in commission: three (TB, SV and RF). Flying time: 14 hrs. 45 mins. Instruction: (9) 4 hrs. 50 mins. Soloist: (1) 1 hr. 55 mins. "A" pilots: (5) 7 hrs. 5 mins. "B" pilot: (1) 20 mins. Passengers: (1) 10 mins. Test flights: (4) 25 mins.

FROM THE FLYING SCHOOLS

Brooklands School of Flying, Brooklands Aerodrome

(FEB. 25-MAR. 3).—Managing director: Capt. H. D. Davis, A.F.C. Instructors during the week: Captain H. D. Davis, A.F.C.; Major C. M. Pickthorn, M.C. Total flying time: 24 hrs. 10 mins.

In spite of the unfavourable weather conditions at the beginning of the week, the flying time has exceeded all winter records and last Sunday proved that the school is quickly becoming recognised as a happy meeting place for private owners.

The latest and one of the most enthusiastic recruits of the school is Sir Philip Richardson, M.P. who had his first lesson on Saturday, and showed himself a very apt pupil. Sir Philip has purchased his own machine and is rapidly infecting his large circle of friends with his enthusiasm. Lady Richardson has had her first experience of aerobatics.

Mr. L. R. Nieuwenhuizen has taken delivery of his "Moth" G-AAAG—on which Flt.-Lieut. (Tiny) Schofield gave his usual display of stunt flying on Sunday afternoon.

The following six new pupils have joined the school this week:—Messrs. Dawson, Cardew, Parker, Patkar, Wodehouse and Barucha, who has come all the way from Bombay to qualify for his "B" licence.

North Sea Aerial and General Transport, Ltd., Brough Flying School

(FEB. 24-MAR. 2).—No flying was possible during the first four days of the week owing to snowstorms and high winds, but during the latter part of the week the weather cleared and gave us three really fine days, during which we managed to get in nearly twelve hours' flying.

Flying-Officer Rimmer, who had broken his course, returned on Monday and completed his training for 4 quarters by Friday. Flying-Officer Lumsden left on Tuesday, having completed 3 quarters' training, and on Wednesday, Flying-Officer McConnell reported. The times on Kangaroos were:—Dual, 35 mins. solo; 8 hrs. In addition, Mr. J. B. Stockbridge carried out a test flight of 5 mins. duration.

Messrs. J. Riddell and H. W. Hall received 2 hrs. 5 mins. dual on Bluebirds, but neither of them has yet reached the solo stage.

The total flying time for the week was 11 hrs. 45 mins.]

AIR COMMUNICATIONS

An Informative Address

BRIGADIER-GENERAL P. R. C. GROVES, Hon. Secretary General of the Air League of the British Empire, gave an address to the London Chamber of Commerce, on February 27, on "Air Communications." In the course of this he gave some illuminating air statistics. The length of the world's air routes in actual operation now totalled 76,000 miles, he explained. The air route mileage of Europe (including Soviet Russia and the French extension to Senegal) totalled 49,000 miles, an increase of 33½ per cent. over 1927. Of that air route mileage, Germany had 18,000 miles, France 12,500 miles and Great Britain 1,080 miles. Even if we included the Cairo-Basra service our total air route mileage was only 2,200 miles.

German Development

Nothing was more remarkable in the history of aeronautics than the development of German commercial flying. In 1923 German commercial aircraft carried 8,000 passengers; in 1924, 13,000 passengers; in 1925, 55,000 passengers; in 1926 the whole system was reorganised, which involved stopping flying on many air routes for a considerable period, and the increase was therefore small; the total number of passengers carried being 56,000. But in 1927, the total number of passengers was over 102,000; in 1928 it was 111,000. Thus, within a period of six years, there was roughly a fourteen-fold increase in the number of people who travelled by air.

The increase in freight and mail was even more striking. In 1923 it amounted to 44 tons; in 1927 it was 1,843 tons, and in 1928, 2,385 tons. The lecturer then traced the advantages Germany had gained by the development of commercial flying. It was true, he said, that it had its great lead largely as a result of State subsidies. But the total amount from the Government had averaged less than £1,000,000 a year—a mere bagatelle from a national point of view. The German subsidy for the current year is £840,000, as against our £250,000.

French and American Aviation

Turning to France, General Groves said that last year the French Government followed our example by setting up a separate Air Ministry, and announced a considerable programme of expansion. The new Air Minister had asked the Chamber of Deputies to increase the civil aviation vote from £1,755,000 for the current financial year (finishing April 5) to £2,555,000 for 1929, with a further substantial increase for 1930 and subsequent years. He proposes that the annual subsidy, which amounts for the current year to £997,000, should be increased to £1,375,000 for 1929, and to £1,500,000 in 1930. Judging by the reception given to these demands by the French press there seemed but little doubt that the increase would be voted.

In America he said that the Government led the way by laying out the New York-San Francisco airway and operating it as an air mail service. That line was inaugurated in September, 1920, and was confined to a day service only until July, 1924, when the lighting of the line was completed and a day and night service was inaugurated. The route has developed into the most completely-equipped airway in the world. The distance between New-York and San Francisco was now covered in 29 hours as against nearly four days by the fastest train. A standard of 93 per cent. of efficiency was maintained throughout last year. The great success of the service, which was put out to contract and taken over by civil enterprise in 1927, led to a public demand for feeder lines, with the result that there were to-day some 12,395 miles of air routes in regular operation, most of which carry passengers in addition to mails and freight. Of that total air route mileage some 8,000 miles are lit for night flying. A recent survey had shown that the average daily transfers of funds and securities between New York and Cleveland

amounted to \$1,300,000, and between New York and Chicago to \$5,000,000. In fact, the majority of those transfers were now sent by air, and the daily interest saved was very considerable. The boom in commercial flying in America during the past few years had been very remarkable. There were now 2,000 cities and towns which were either equipped with airports or had allotted space for the purpose. In six years the capital investment of the aircraft industry had increased from \$5,000,000 to \$100,000,000. In addition, over \$50,000,000 were invested in air transport enterprises.

Successful Unsubsidised Air Lines

Last May, Mr. Hoover, then American Secretary of State for Commerce, now President of the United States, made the following statement:—"Two years ago civil aviation, which is under a branch of the Department of Commerce, gave evidence that a time-saving element would soon make it self-supporting. To-day a third of the existing lines, although they are wholly unsubsidised, pay a fair return on invested capital, despite the pioneering period, and others are near that goal."

"Civilian contractors have now taken over from the Government the operation of these air routes at competitive rates, less than half those authorised by law. Routes covering 3,300 miles flying daily have been authorised, an increase of 340 per cent. in two years. The Government lights the airways, provides intermediate fields, beacons and radio communication; examines the craft, licenses the pilots, maps the airways, distributes weather reports, encourages the establishment of municipal air ports, but does not subsidise. Of \$4,360,000, this year's appropriation, more than three and a-half millions are for increasing facilities. There are now almost 6,000 miles of lighted airways; by June there will be 7,500 miles. March saw 5,055 applications for aeroplane licences, 3,925 pilots' licences, 1,322 students' licences and 2,294 mechanics' licences. Two hundred airports have been established during the year. The Government participated in the tours of Byrd, the North Pole flier, Colonel Lindbergh and others."

The British Empire

Coming to the British Empire, General Groves said that as an indication of the position which we now occupied he would mention that last summer Germany was flying commercially some 45,000 miles a day on an average, as against our daily average of 3,000 miles. Our total air fleet consists of but 21 commercial machines while both France and Germany each have several hundreds. We were now about to extend our Cairo-Basra service to Karachi and connect London by services (partly by air and partly by train) with Cairo. That would be a great advance but for the fact that we were only adding four machines to our air fleet. That was not the fault of the company concerned, but was due to lack of official and public support.

During the past three years Imperial Airways, our only air transport company, had flown a distance of 3,283,000 miles and carried 87,600 passengers without injury to any one of them. There was a conclusive answer to the very common question: Can commercial flying be made safe? As regards regularity, during the summer months of 1928, Imperial Airways completed 98.8 per cent. of their scheduled flights. For the whole of 1927 the percentage was 92.5. By far the greatest factor in the question of reliability was that of flights cancelled owing to bad weather. But for that Imperial Airways' standard of reliability for last summer worked out at 99.8 per cent. On the Cairo-Basra weekly service, a distance of 1,135 miles, 100 per cent. regularity had been maintained for months together.

In conclusion Gen. Groves discussed the scope for air communications from Great Britain, and appealed to the London Chamber of Commerce to form an aviation section.

Engine Performance Tests

ON March 14, Wing-Commander G. B. Hynes, D.S.O., will lecture before the Royal Aeronautical Society at 6.30 p.m., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, on "Engine Performance Tests." In the course of his lecture, Wing-Commander Hynes will draw comparisons between bench tests and full performance tests of engines, and describe methods of testing.

The Wrong Pilot

IN our account of the christening ceremony of the Westland "Wapiti" for Australia published last week, it was stated that the two "Wapitis" were piloted by Mr. Brunton and Mr. Penrose respectively. It has been pointed out to us that this was not the case, and that the two machines were, in fact, piloted by Flight-Lieut. Paget and Flying Officer Brunton.

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AIRISMS FROM THE FOUR WINDS

African Service Flight

THE R.A.F. Fairey IIIFs. (Napier "Lions") engaged on the annual flight from Cairo to Cape Town and back, reached Pretoria on March 3. They have been co-operating with the 4th King's African Rifles. The squadron carrying out this flight is No. 47.

Squadron for Basra Leaves

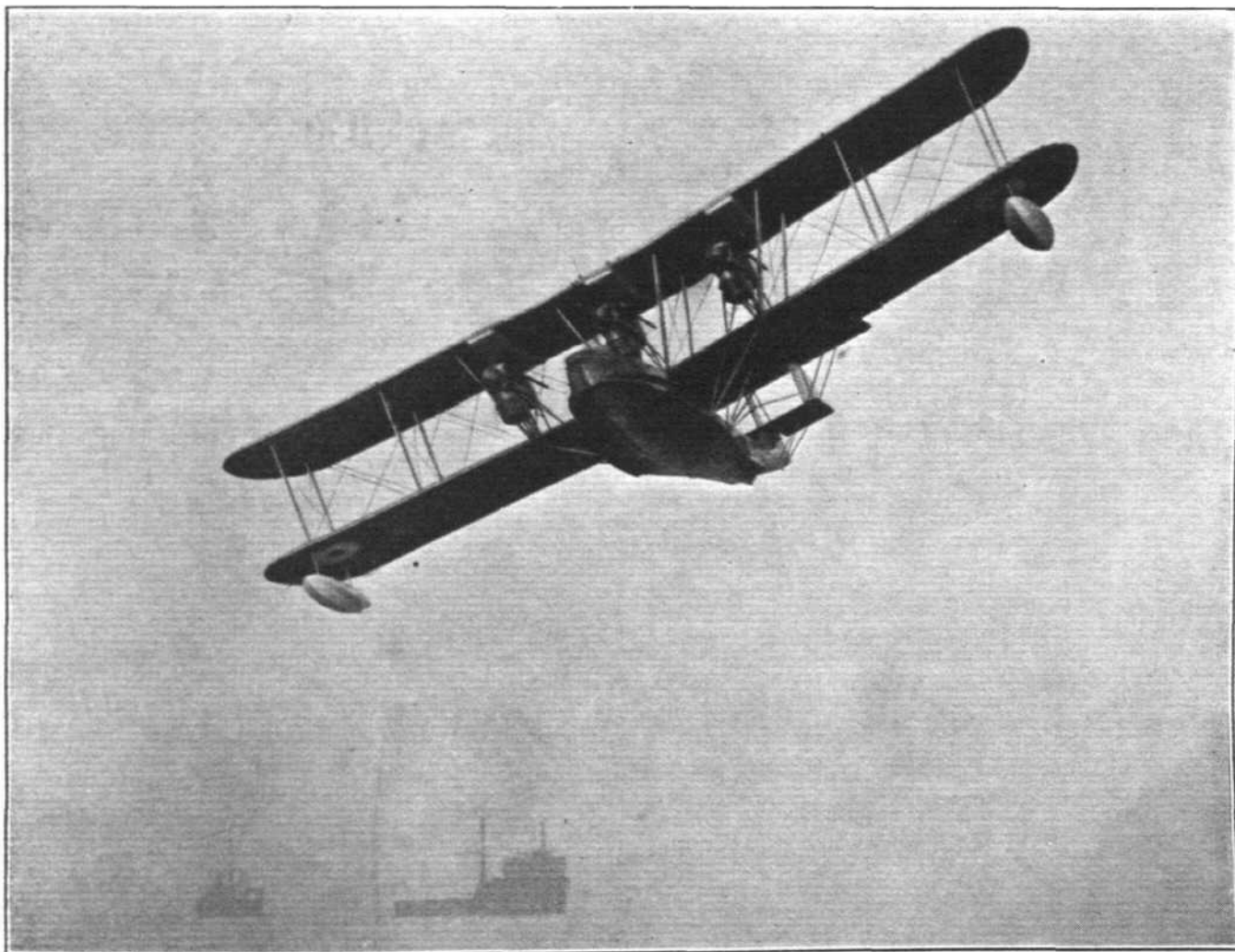
THE squadron of three R.A.F. Supermarine "Southampton" (Napier) flying boats left Cattewater, Plymouth, for Basra on February 28. In command was Wing-Commander T. E. B. Howe, owing to Group-Captain H. R. Busteed being indisposed. After taxiing from the Cattewater breakwater across the Sound to Cawsand Bay, the flying-boats were on the water for over an hour before taking-off. The town was circled and then a course was set across the Channel for Hourtin, near Bordeaux. On March 1 they called at the air port of Benc in the afternoon on their stage from Hourtin and Lorient. They were due to continue to Naples on March 2. The personnel of the squadron, which will be stationed at Basra for two years, is as follows:—Wing-Commander T. E. B. Howe, Flight-Lieut. G. L. Gandy, F.O. R. F. Shenton, and Corporal G. W. Emony in flying-boat No. 1,299; Sqdn.-Ldr. R. M. Bayley, F.O. W. G. Abrams, Sergt. T. W. Hamlin and Leading Aircraftsman K. G. Major in No. 1,298; and Flight-Lieut. W. J. Daddo-Langlois, F.O. H. F. G. Southey, Flight-Sergt. R. Whittow and Aircraftsman W. Swann in No. 1,000.

Flight to China

ON March 2, Mr. Wen Lin, a Chinese airman, and Mr. Christian Johannsen, a Dane, set out on a flight to China in an Avro "Avian" ("Cirrus"), one of the fourteen "Avian" machines ordered by a flying school in Nanking. The coast was crossed between Lympne and Dover in a stiff head wind. Whilst over the Channel engine trouble developed and they turned back. The machine lost height from 2,000 ft. as they approached Dover, but a landing was attempted just inland, when a gust of wind caught the machine and tipped it on its propeller. A new propeller was sent for and the flight was resumed safely via Amsterdam on March 4. The proposed course is via Berlin, Prague, Constantinople, then across Asia Minor and Irak to India and China.

French Air Mail Flight Fails.

ON the last lap of a rapid flight to Saigon, Indo-China, from Paris, the French airmen, M. Paillard, Lieut. le Brix and M. Jousse (mechanic) crashed at the Gulf of Martaban on February 26 on the shore about 122 miles from Rangoon, which they had left to reach Saigon. This occurred when attempting a landing on what appeared to be sandy beach but proved to be quagmire. The machine, a Bernard cabin monoplane (450 h.p. Lorraine Dietrich engine), sank and the crew were imprisoned. Villagers assisted them, and the mail and some of the luggage were also rescued, but the machine was washed away. The mechanic was injured in the leg and Le Brix suffered minor injuries, but M. Paillard



["FLIGHT" Photograph]

APPRECIATION: The Blackburn "Iris" flying-boat with Rolls Royce "Condor" engines. Arrangements have recently been completed for building the "Iris" in the United States. It is also believed that this machine is the type referred to by Sir Samuel Hoare in connection with a new flying-boat squadron.

escaped injury. Their flight started on February 19, as an experimental mail flight and but for the mishap they would have reached their destination in eight days. The stage of 937 miles from Cairo to Basra was flown non-stop in 9 hrs. 25 mins.

Col Lindbergh's Accident.

It appears that Col. Lindbergh suffered a dislocation of the shoulder in his crash on February 27 at Mexico City. His fiancée, Miss Ann Morrow, was uninjured. He was flying again the next day, however, with one hand, in a commercial monoplane, accompanied by Miss Morrow.

Light 'Plane Flight to India

MRS. SPENCER CLEAVER, daughter of the Finance Minister in Northern Ireland, is planning to fly to India in a "Gipsy-Moth," starting this week. Her programme provides for a return flight within six weeks. She will be accompanied by an Imperial Airways pilot. She has been flying as a passenger for many years, and is now learning to fly with Col. Henderson at Croydon.

Business Air Tour

MR. VAN LEAR BLACK, the American millionaire, who is engaged on a 35,000-mile flight to South Africa and the Far East, left Bulawayo on March 1, and arrived at Pretoria. His machine is a Fokker monoplane with three Wright "Whirlwinds."

Riga-New York Non-Stop?

A REPRESENTATIVE of a group of American capitalists is in Riga to discuss plans for a non-stop flight from that place to New York.

Queer Air Companion

WHEN officials of Imperial Airways recently opened a small flat box which had been left by a passenger, they found it contained a live tortoise wrapped in pink cotton wool, and with the back of its shell studded with rubies, emeralds and other coloured stones. Further inquiries revealed that the box belonged to a woman who had flown from Paris to London in the 12-noon air liner last Saturday. No application has yet been made for the pet.

Seadromes in Atlantic

WORK is to begin immediately on the construction of artificial islands in the Atlantic as seadromes for aircraft. Henry J. Gielow, Inc., have announced this statement in

New York, according to the *Times* correspondent there. Eight of these are proposed, the first to be laid between America and Bermuda. This will be 1,200 ft. long, 200 ft. wide at the end, and 400 ft. at the centre. The landing platform will be 100 ft. above the level of the ocean, and the base will extend to a depth of 50 ft. below the point at which it could be affected by wave action. The construction will be on stilts and anchored by chains.

By Air to the Races

IMPERIAL AIRWAYS are to operate services of Handley-Page (Napier) air liners between London and the provincial race meetings during the coming season. The first of these race specials will be run from London to Liverpool for the Grand National.

Spanish Airship Tested

THE first modern airship built in Spain made a successful trial flight of two hours at Guadalajara on February 24. The designer is Maj. Maldonado, an officer of engineers. The airship is about 178 ft. in length and about 40 ft. in diameter. It will be used as a school for pilots. There are two engines of 200 h.p., imported from Czechoslovakia.

American Tour

CAPT. W. N. LANCASTER, the pilot who flew to Australia with Mrs. Keith Miller in an Avro "Avian" ("Cirrus") last year, has started an air tour from New York to the Caribbean Sea and the Gulf of Mexico.

Schneider Trophy Race

THE Royal Mail Steam Packet Company announce that arrangements are being made for their South American liner *Almanzora*, a vessel of 16,000 tons, to make a special week-end cruise in the Solent on Saturday, September 7, to Monday, September 9, to view the Schneider Trophy Race. Passengers on board the R.M.S.P. cruising vessel *Arcadian* which will be returning to Southampton from the northern capitals, and the R.M.S.P. *Araguaya*, sailing for the Mediterranean on September 7, will also have the opportunity of seeing the race.

Easter Air Meeting.

AT the conclusion of the Easter flying meeting of the Cinque Ports Flying Club an informal annual club dinner will be held at the Majestic Hotel, Folkestone, at 9 p.m., on Saturday, March 30.

THE "ITALIA" AIRSHIP ENQUIRY

Adverse Finding

THE Italian Commission of Enquiry on the disaster to the *Italia* airship, which crashed whilst returning from its flight to the North Pole in May last year when commanded by General Nobile, has sent its report to Signor Mussolini. It is in three sections:—(1) Dealing with the causes that led to the loss of the airship; (2) with the conduct of the survivors after disaster; (3) with the relief work.

On the first point the Commission find that the loss of the airship arose from a fault in handling, and was also due to the composition of the crew and the use made of them. The Commission holds that the fault in handling was that of the commander.

With regard to the second section the Commission unanimously affirms that the conduct of Majors Mariano and Zappi cannot be in any way censured, but is, on the contrary, worthy of praise.

As to the rescue of General Nobile, the Commission is agreed upon the point that there is no acceptable justification for his act, and that it can be explained only, but not justified, by the condition of physical and moral depression in which he was—a condition which did not allow him to estimate at its right value and in its consequences what his action meant, especially in view of the pressing invitation of the Swedish airman Lundborg.

With regard to the relief work, the Commission thinks that everything possible was done for the discovery, assistance and rescue of the survivors, and for the tracing of the airship. This work was accomplished smartly by the Italians and the efficient co-operation of foreigners. It constitutes an admirable example of human solidarity, which culminated in the fortunate cruise of the *Krassin* and the generous sacrifice of Captain Roald Amundsen.

The *Daily Telegraph's* correspondent in Prague stated on March 4 that the *Ceskoslovensko* published statements by Prof. Karel Behounek, the Czechoslovak member of the *Italia's* crew. Dr. Behounek told the Commission, he states, that the action of Zappi and Mariano in abandoning Malmgren was inexcusable. He criticises the composition of the

Commission, which consists entirely of naval officers, only one of whom, De Pinedo, is a flying expert. He roundly declares that the object is to exonerate the naval participants in the expedition, Zappi and Mariano, at the expense of General Nobile. All the non-Italian witnesses, says Dr. Behounek, gave evidence exonerating General Nobile, whereas the Italians concentrated an attack on him. Especially did Cecioni, who said: "General Nobile's incapacity to handle the situation and the incompetent steering of the airship were entirely responsible for the disaster, which could have been avoided." In reply to the three questions on which the Commission invited him to express himself, Dr. Behounek said: "As to the responsibility for the disaster, the wreck was so sudden that any measures to avoid it were impossible."

Asked regarding General Nobile's flight from the "Red Tent," Dr. Behounek said that in the circumstances the rescue of General Nobile alone was the only possible course. Lundborg gave similar evidence.

The *Italia* airship flew to King's Bay, Spitzbergen, in May last year from Italy, and after preliminary flights it set off for the North Pole and reached it on May 23 shortly after midnight. Flags were dropped and wireless messages transmitted to Italy. On the return flight strong head winds were encountered and a crash followed off North East Land.

There was a silence lasting a fortnight, then wireless communication was made by the supply ship, *Citta di Milano*. It was found that the crew were in two parties. General Nobile was with some who had crashed with the gondola, and the remainder had drifted with the envelope and were never seen again. Aircraft of many nationalities joined in the rescue work. General Nobile was flown to safety by Lieut. Lundborg, and the others were rescued by ship. Nobile was badly injured. Maj. Zappi, Maj. Mariano and Dr. Malmgren, the Swede, attempted to reach the mainland on foot. The former were rescued, but the latter died on the way.

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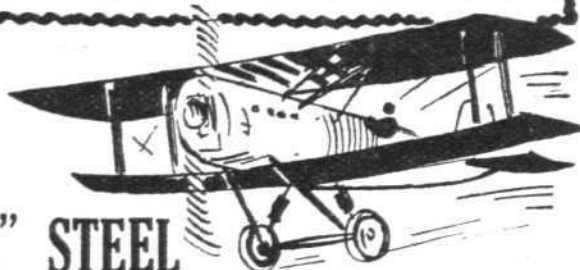
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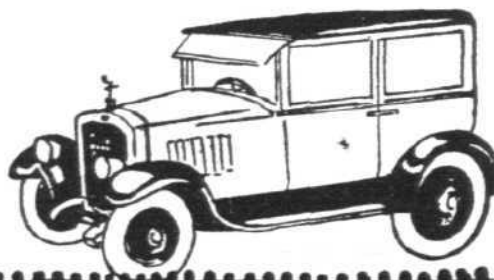
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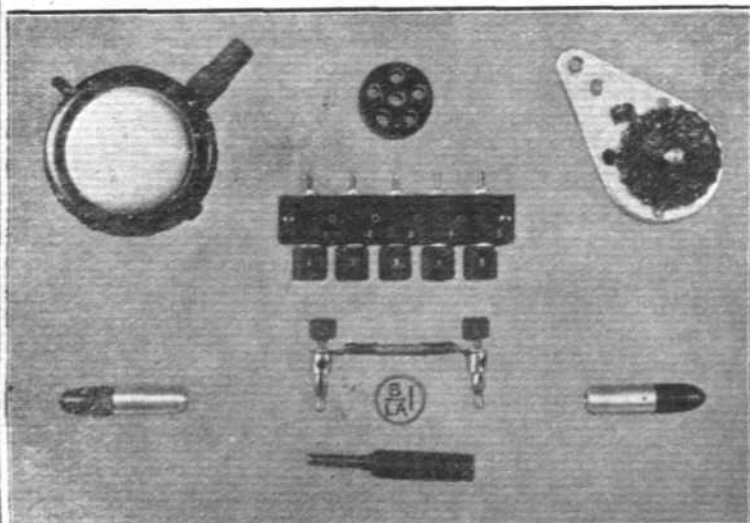
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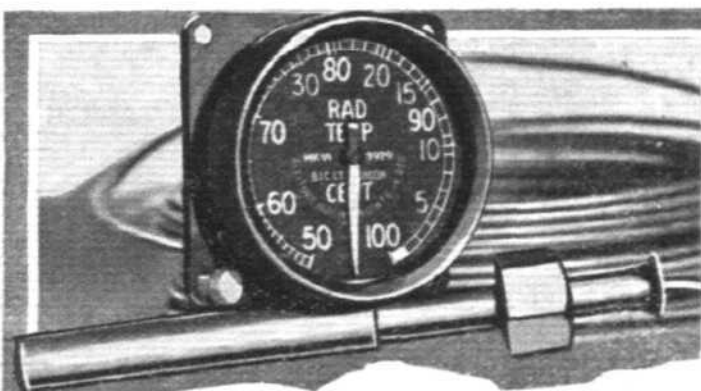
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THE CRUISE OF THE R.A.F. FAR EAST FLIGHT

Group-Captain Cave-Browne-Cave's Interesting Lecture to the Royal Aeronautical Society and Inst. of Aeronautical Engineers

On March 4, Group-Capt. H. M. Cave-Browne-Cave delivered his lecture, on the cruise of the R.A.F. Far East Flight, to the Royal Aeronautical Society and Institution of Aeronautical Engineers. We are unable to give this lecture in full owing to pressure on our space, and furthermore much of the lecture dealt with facts that have already been recorded in *FLIGHT* when we published the official logs of the cruise issued by the Air Ministry (see *FLIGHT*, April 5, August 9, 1928, and January 17, 1929), so that it will only be necessary for us here to refer to the various points in the lecture which are new or are of special interest.

In his opening remarks the lecturer explained the formation and objects of the flight—which were to give Service personnel experience in carrying out long cruises with a Flight operating independently of surface vessels and shore bases; to gain technical and operational experience of the development of flying-boats; to collect information on seaplane bases, harbours, and local conditions affecting aircraft throughout the routes flown; and to show the flag, and foster the spirit of mutual co-operation between the Mother Country and the parts of the British Empire visited.

He next dealt with the programme and route, and the preparation for the cruise and equipment used. The information available in the Directorates of Civil Aviation and Meteorology at the Air Ministry, and the pilots and charts published by the Admiralty, helped in the selection of ports to be visited and to realise the conditions likely to be met. Parts of the route—Southern India, for example—had not been visited by aircraft, but the majority of it had been flown over, and they had the advantage of the experience gained by the American Round the World Flight, the Marquis de Pinedo, Sir Alan Cobham, Group-Capt. Goble, the R.A.F. Mediterranean Cruise, and others.

It was worth remembering, said the lecturer, in planning a cruise that the information required on wind speed and direction, prevalence of heavy rain, fog, storms, etc., is often conveniently summarised on charts for various districts for each month of the year. For example, for the last stage of the cruise the information required was obtained from the November and December sheets of "Maps showing mean atmospheric pressure, wind direction and force over China Sea," published under the authority of the Governor of Hong Kong.

Aircraft

The machines used on the cruise were five metal-hulled Supermarine "Southampton" flying-boats fitted with two Series VA Napier "Lion" engines each; four boats were used for the cruise, and the fifth was shipped to Singapore as a spare. Certain modifications and alterations were made to meet the requirements for the cruise.

The standard anodically treated duralumin hull and wing tip floats that were used, were finished with white enamel inside and out, except that the inside of the hull bottom up to the chines was grey. Two scuttles were fitted on each side of the hull below the centre section, the hinges were aft, and the scuttles had side plates which made them very effective wind scoops when open. Proper stowages in the hull and centre section were arranged so that the whole of the equipment, cooking stove, food, water, clothes, spares, charts, emergency rations, medical kit, awnings, cockpit covers, tools, bilge pump, refuelling gear, etc., were stowed, and the hull was clear for the crew except for the rubber dinghy, which was deflated, folded up and stowed on the floor plates under the pilots' seats, and the anchor rope which was coiled down under the front rudder bar position. The drogues and tripping lines were stowed in pockets on the centre section so as to avoid bringing water into the hull.

The size of the two fuel tanks in the top plane was increased to 250 gallons each; they were made of tinned steel painted white; light alloy tanks would have been lighter, but it would not have been possible to repair them with the facilities available, and they might have corroded internally when not completely full of fuel—throughout the cruise they only refuelled to the amount of fuel actually required for the work in hand, and had no trouble with any of the tanks. Drains were fitted in the bottom of each tank and at the lowest point of the fuel system, and the water condensed in the tanks was always drawn off immediately before flight. The oil tanks were increased to 18 gallons each, to leave an ample air space above the 14 gallons of oil carried for flights with full fuel; these tanks were fitted with a baffle with small holes in it so that only a small quantity of oil was circulated when the oil was cold, and even in cold weather the engine could be run up safely to full power as soon as the water was warm. With these oil tanks no oil coolers were required during the cruise. The maximum oil temperature in flight was 68° C. with a strut temperature of 27° C. Oil coolers with five elements each were fitted for trial between Singapore and Perth; they reduced this oil temperature about 7° C.

The radiator surface was increased to nearly 50 per cent. more than the standard radiators used in home waters; it was found that with shutters wide open the maximum water temperature in flight during the cruise was 76° C.

Drinking and washing water was carried in two portable 5-gall. drums and one 4-gall. ready-use tank with a tap in the bottom. Light awnings were made to protect the hull forward and aft of the superstructure from the sun when on the water, and these could be pulled down to keep rain out of the hull without having to put the cockpit covers on and spoil the ventilation. They did not interfere with work on the moorings.

Gear was made and tested for getting a spare engine on to the centre section with the aircraft moored out, flying it to the aircraft requiring it, and changing engines on the water. An extensible strut was made which enabled wing root struts to be changed with the aircraft moored out. The tail trolley was redesigned so that the whole of the beaching gear could be carried inside the hull and flown to an aircraft requiring it. None of this gear was carried in the aircraft during the cruises; it was sent with the spare engine to the main depot for each stage (Karachi, Singapore, Melbourne and Hong Kong), being moved on from one to another of these as the stages of the cruise were completed.

Care was taken to ensure that every part of the aircraft, except the hull bottom, could be examined, cleaned and maintained with the aircraft moored out; and tear-off inspection patches were fitted on the fabric surfaces as necessary for the examination and adjustment of the internal wires and fittings. Steel fittings, nuts, bolts, etc., were made of stainless steel as far as possible. The streamline wires and struts were zinc-coated and painted. Light alloy parts were anodically treated, where this was applicable, and those outside the hull were painted also. Particular attention was given to preventing water getting into the fabric-covered surfaces where rods, wires and pipes came out, and to drain the inside of these surfaces completely—the drain hole being flush with the surface and not stand up above it like an eyelet.

Particular care was taken to prevent any petrol getting into the hull.

All fuel tanks, pipes, cocks, refuelling gear, etc., were kept outside the hull, consequently cooking, lighting, mooring lamps and sleeping inside the hull were safe from petrol fumes—no smoking or naked lights were allowed from the time the refuelling boat approached until half an hour after it had left.

The armament gear was not fitted—it was shipped to Singapore in case of emergencies. The only armament carried was a Service automatic pistol, a Versey's pistol, and a .22 rifle with appropriate ammunition in each boat.

Equipment

Referring briefly to the equipment, the lecturer stated that each boat carried one Mark XIIA anchor, weighing 58 lbs. The anchor line was 15 to 20 fathoms of 2½-in. Manilla rope, with a cut splice 7 fathoms from anchor-end, to which sandbags could be shackled when additional holding power was required. These were carried empty, and were filled with any suitable material when required.

Evans' jackets were used as flying and floatation jackets, and the standard R.A.F. flying topee, with sponge rubber pads and anti-glare goggles, was used. No parachutes were carried, and the thick cushions in the pilots' seats made good lifebuoys, were used as fenders, and in one emergency, to buoy the position of the moorings.

The bedding of each man was a sleeping bag—practically a large eiderdown sewn up the side with a removable mackintosh bag as a cover—a sheet sewn into a bag to act as a washable lining to the sleeping bag, a light blanket and cushion or pillow. Two of the aircraft carried F.20 5-in. by 4-in. roll film cameras when the flights were over British territory.

Turn indicators and P.4 and 0.3 compasses were used. The refuelling gear was a small aluminium hand pump with gauze suction and discharge filters, its capacity against the normal lift of about 18 ft. was about 350 gallons per hour—one 12-ft. and two to three 7-ft. lengths of flexible metallic refuelling hose, with a light stand pipe for dipping through the small bung holes of some barrels. Later in the cruise a small filter was found, which could be pushed on to the end of the stand pipe and very quickly cleaned, saving much time when the fuel was dirty. The fuel was never filtered through chamois leather, and they never had any trouble with dirty petrol in the aircraft tanks or engines.

Each flying-boat carried a rubber dinghy; two different types were tried during the first stage of the cruise, and a triangular dinghy designed and made by the Royal Aircraft Establishment was found the best.

Oil mooring lamps were used as many of the stays were over three days, and the accumulators carried would only run the boats' lighting for that time before recharging was necessary. Accumulators could only be recharged in flight or by taking them ashore where there were charging facilities. The lecturer added that they never found a satisfactory oil mooring light which was compact and light, but he understood they were being developed.

The personal kit of each crew of four weighed about 180 lbs., and it was found that anodically treated aluminium suit-cases, designed to fit between the frames of the hull, were lighter for a given capacity and more satisfactory for flying-boat work than normal suit-cases.

The spares carried by each boat consisted of one inlet and two exhaust valves complete with springs, 24 sparking plugs with washers and clips, a contact breaker for the main and for the starting magneto, an oil filter cap, 6 ft. of high-tension cable, 6-in. lengths of various sizes of I.R.P.R. tubing, ½ sq. ft. of 22-gauge copper sheet for patching water jackets, a spare drogue, an oil funnel, a Sorbo rubber pad which could be forced against the bottom between the frames (also useful as a fender or cushion), two small leak stoppers, spare parts for metal couplings, asbestos and water-pump packing and jointing material, gauze for filters, a little fabric and fabric strip with needles and thread, dope white enamel and brushes, a few short lengths of duralumin angle bar, lamp bulbs, W.T. valves and aerial weights, 8 yards of Unisheath electric cable, carbon brushes for the generator, a spare high-tension battery, an electric torch, grease, tallow, locking wire, copper wire, insulating tape, fibre and emery cloth, a selection of rivets, screws, bolts, nuts, washers, split-pins, clips, joints, control wire, and thimbles. The tools included the small engine tool kit, oil-can, small vice, soldering gear, and a small carborundum stone. Divided between the four boats of the flight were two wood aircrews with bosses (later replaced by two metal aircrew blades when all the Flight used metal aircrews), one streamline wire of each size and length used, two magnetos, one single and one duplex carburettor float, 12 piston and scraper rings, two collets for aircrew hubs, and a few special joints and tools, such as the aircrew extractors.

The total weight of each flying-boat completely equipped for the cruise with crew on board, was 14,600 lbs. when carrying the normal 400-gall. fuel load, and 15,400 lbs. when ready for the longest stages with full tanks (500 galls. fuel). The span of the "Southampton" is 75 ft., the length 50 ft., the area of the main planes 1,450 sq. ft., and the normal full power 1,000 h.p.

The same four aircraft, S. 1149 to S. 1152, were used throughout the cruise, except that on the arrival of the Flight at Singapore from Australia the spare Southampton (S. 1127), which had been shipped to Singapore, changed places with S. 1149 for experimental purposes, in accordance with Air Ministry orders.

The Flight had a total of 22 Napier "Lion" engines. Eight of these were used for the first three stages of the cruise, by which time they had completed over 300 hours' flying each; they were then removed for examination and refit, and the next eight engines were fitted. The remaining six engines were not used, but were available as spare engines in case of trouble.

The main supply of stores for the Flight was sent to Singapore and Melbourne; part of the former went via Karachi in case the Flight might need them there. The part of the Melbourne stores not used by the Flight and required by the R.A.A.F. for their Southampton were sold to them, and the remainder were returned to Singapore for the use of the Flight there. The stores for Hong Kong were sent up from Singapore and the unused ones were returned there.

In addition to the above, a few spares were put down at intermediate ports. For example, for the last stage (4,655 sea miles) spares were put down at Manila and Bangkok; these consisted of an oil filter cap and spring, some Jubilee clips, water-pipe connections and parts, a water-pump lubricating cup, a contact-breaker, some sparking plugs, carburettor parts, linen fabric and strip, control wire, and nuts for exhaust-pipe flanges.

The fuel supplies allowed for a possible head wind of 20 knots on any stage with a margin of 50 per cent. to cover losses by leakage, evaporation, spilling during refuelling, rejection of dirty petrol, etc. The Flight used much less fuel than this, as the wind, on the average, was slightly favourable and the losses from the causes named about 5 per cent. The oil was changed about every 20 hours' flying. The oil removed always appeared in good condition but the period between changes was not extended as many places visited were very isolated and spare engines were far away; for example, for the

Australian stage of over 10,000 miles, the spare engines were at Singapore and Melbourne.

Small supplies of paraffin for the cooking stove and mooring lights, and distilled water for accumulators, engines and drinking, were also arranged. The distilled water was, perhaps, a luxury, but was not difficult to put down with the fuel, and it was hoped its use would avoid troubles due to furred-up radiators, corroded water-jackets, and sickness due to drinking impure water. In a few cases the distilled water was supplied in containers which were dirty or had contained acid, and it had to be rejected. Fortunately at these places good water was obtainable locally.

Arrangements were made for moorings for the four boats to be available at each refuelling base. A holding power equivalent to 15 cwt. of iron on the bottom was asked for. These moorings were generally extemporised from the material available locally.

The personnel of the Flight were fully occupied in preparing for the cruise receiving instruction in semaphore, Morse, cooking, boat work, first aid, swimming, etc., and in learning their special duties. For example, the W/T operators were responsible to the first pilot of their boat for the cooking, rigging repairs and adjustments, cleaning of hull and superstructure, mooring gear and lamps, in addition to their duties with the W/T and electrical gear. As any airman of a boat's crew might be left in charge of a flying-boat at moorings, he had to practise starting up the engines and slipping moorings single-handed, taxiing the boat in traffic, etc. All the fitters in the boats' crews were taught simple flying. All the alterations to the aircraft and the equipment had to be tested out. Each crew had to practise working and living together as a crew; maintaining the aircraft and changing engines, etc., on the water without dropping essential parts overboard. All the personnel were kitted up for foreign service, inoculated, vaccinated, and sent on a month's leave before the aircraft for the cruise were ready for delivery at the end of September.

On October 13 everything was ready, the boats were launched, tested and moored out at Felixstowe, and the Flight was inspected by senior officers from the Air Ministry and Coastal area.

On October 14 the Flight left Felixstowe at 09.00, flew to Plymouth, secured to buoys in the Cattewater, and refuelled. The conditions during most of the flight were rather unpleasant with rain and mist, but the weather was good at Felixstowe and Plymouth. During the flight the bottom water elbow on the starboard radiator of one aircraft split at the flange. As there was time, a new radiator was obtained from the makers and fitted. Longer rubber connections were bought in Plymouth and fitted between these elbows and the bottom water pipes in all the aircraft, so as to reduce the risk of similar failures during the cruise; this proved quite effective. The Air Ministry had stronger elbows and stays for the bottom water-pipe made and sent out to the Flight; these were fitted at Singapore. A small leak was found in the oil tank of one aircraft, where the supporting tube passes through the tank; this was repaired.

Group-Capt. Cave-Browne-Cave proceeded to give a detailed account of the four stages of the cruise: first, Felixstowe-Karachi; second, Karachi-Singapore; third, Singapore-round Australia-Singapore; fourth, Singapore-Hong Kong-Singapore. The official logs, previously referred to and published in *FLIGHT*, covered most of these details except in the case of the fourth stage, so we need only refer here to the lecturer's remarks on the latter. The route was as follows: Singapore; Kuching; Labuan; Princessa; Manila; Salomague; Hong-Kong; Tourane; C. St. Jacques, Saigon; Tachin, Bangkok; Victoria Point; Penang; Singapore. A total distance of 4,655 nautical miles.

"This stage," said Group-Capt. Cave-Browne-Cave, "was flown in November and December, which is the early part of the N.E. monsoon and the wet season along the east coasts of Malaya and Annam and the north coast of Borneo, but the dry season for the rest of the route. The Flight met a good deal of rain at first, but the storms were local and all the heavy ones were avoided by small alterations of course. There were some heavy thunder and rain storms whilst we were at Kuching—about one a day—and one at Labuan. This season is comparatively free from typhoons, but we knew from the records of past years that one would probably form to the east of Luzon and pass over to near the Amman coast, re-curving northwards. A severe typhoon did this whilst the Flight was at Hong Kong, and although it delayed the Flight three days, as already stated, it did not come close enough to give us bad weather. The Flight could move much faster than the typhoon and I think we could have avoided it whatever course it had taken, as we were in a very good position to know its probable movements. The worst weather we experienced was in the east of the China Sea between Salomague and Hong Kong. We knew it was practically certain that we should find a N.N.E. wind of 25 to 30 knots with low clouds, occasional rain and a very rough sea, and it was so. We tried flying above the clouds which ended at about 3,000 ft., but although the conditions were much better there we had no means of finding our drift and consequently had to come down under the clouds again. Owing to the cracking of one airscrew boss, already reported, the route between Saigon and Bangkok was flown three times and we found that by flying from Saigon below 2,000 ft. and returning above 2,000 ft. a favourable wind could be obtained for each of the overland crossings. The navigator found this on the first flight by noting that the cloud shadows on the ground were travelling in the reverse direction to the wind in which we were flying. It was confirmed by one aircraft of the Flight flying up into the reverse wind and by the subsequent crossings. On the flight up from Puerto Princessa to Manila the weather was bad on the east coast of Palawan and we avoided it and the strength of the head wind by crossing over to the west coast where the conditions under the lee of mountains were good but rather bumpy.

"The route flown is generally suitable for seaplanes. There is, of course, practically no shelter on the crossings between Singapore, and Borneo, and from Salomague to Hong Kong; the latter is nearly always rough, at this period, for the eastern half of the flight. The chart alone is not a reliable guide to the suitability, for seaplanes, of the rivers in Borneo, as there is often much heavy drift wood and some have dangerous 'bores'.

"On arrival back at Singapore the aircraft of the Flight were all flying very well and giving no trouble, and I have no doubt they could have flown back to England if that had been in accordance with Air Ministry policy. They are being refitted by the Base and Flying Parties at Singapore, and by now several of them are again in commission there. The deposits of barnacles were less than on the Indian cruise, but more than on the Australian cruise.

"During all the stages of the cruise the routine maintenance work was carried out by the boats crews. On an average one control wire required renewal in each aircraft about every 60 hours' flying. The equipment and instruments were very satisfactory, except that a revolution indicator failed occasionally, due, I think, to there being no means of lubricating its mechanism without stripping it; the pink liquid in the strut thermometers lost its colour after about four months' exposure, and the aneroid we carried instead of a barometer was reading about 0.3 in. below at the end of the stages, although it was tested and re-set before each."

The lecturer then gave the following general notes:—

(a) Hulls

"In many harbours, in the East serious deposits of barnacles take place on the hull bottoms if flying boats are moored out more than a few days. The warmer and dirtier the water the quicker the barnacles seem to grow. Once they

get a good hold they are very difficult to remove and generally bring the protection paint away with them. We did not find any protective coating which prevented their growth, but they grew much quicker on the black recognition marks, than on white enamel. The best general protective for the hull bottoms we used was V.84 varnish with gums added to make it stick better. The only serious corrosion took place on the rivet points, and some alternative to duralumin rivets is required to prevent these parts needing renewal long before the rest of the structure. We tried Monel metal in a few places, it did not corrode or cause corrosion, but was rather too hard. The work of renewing rivets is much easier when the internal fittings of the hull-lockers, etc., are attached by bolts and easily removed. There was practically no corrosion on the surface of the anodically treated duralumin plates except a little in places where sea water could lie stagnant—under stiffening plates and angles and in the actual joints. The hulls had no double bottoms and they did not leak at all after about the first fortnight when the few tiny leaks in the joints had been found and stopped. A hull ran fairly hard on a sand bank occasionally, but this never damaged it. We found green canvas attacked duralumin when wet with sea water; it attacked the frame of the tail trolleys and was removed. We used white duck canvas for our awnings and covers, this was quite satisfactory, but some of the Flight had experience of balloon fabric covers and considered them neater and better. The type of beaching gear used on the Southampton in which the hull bottom is clear for work without jacking up, and which cannot damage the hull bottom is very much better than a trolley. If we had used wood hulls I think we should have had trouble with borer worms, as in about three months at Singapore they ate through the bottom of a dinghy and through a painted wood frame of 3-in. spruce which was holding some metal samples in the water.

(b) Wood Shrinkage

"The wood frame of the superstructure shrunk very little and practically no internal adjustments were necessary. I think this was due to the care with which the wood parts had been sealed with varnish and the more constant humidity of the air close to the sea compared with conditions inland. A few of the external nuts on bolts passing through wood members required tightening occasionally, I think larger and stiffer packing blocks would have prevented this.

Deterioration

"I understand it is difficult and costly to make parts of stainless material, but I think it will save trouble and be cheaper in the end to use stainless material wherever possible in seaplanes which have to be exposed for long periods. Zinc coating, painting, etc., do very well for a short time, but they will not resist exposure to warm sea water for long. The best protective coating we used was V.84 with added gum for painting on, and lanoline for greasing. It is essential to prevent sea water getting inside the fabric covered surfaces, and particular attention must be given to maintaining watertightness of inspection doors and where wires, rods, tubes, etc., come out through the surfaces. If the top of the hull by the centre section is not watertight rain will drip in and make living inside unpleasant; the places here rain may get in are similar to those in the fabric surfaces. The stowages for tools and spares must keep the water out. The fairings of struts must not allow water to get in and collect. Metals which attack each other when in contact with sea water must not be used in contact. Control cables working over pulleys should be avoided if possible, where they must be used the short length that wears should be connected to the rest of the cable by shackles, so that only short lengths have to be renewed, and it should be possible to fit these short lengths after the eye at each end has been spliced. The edges of former ribs, spars, etc., where fabric may chafe should be rounded and protected with tape. All these points are well known, but I doubt whether it is realised how vitally important they are in flying-boats, particularly if they are to be used in the tropics. Our Southamptons were particularly well protected against deterioration, and we were all surprised at the way they stood up to the very severe test.

Rubber Dinghies

"The triangular rubber dinghy carried by each flying boat weighed just under 50 lbs., complete with pump, oars and repair outfit, and was invaluable. It was used for communication work, and on three occasions for refuelling, and was available for life saving; it could be used for maintenance work under the planes and tail plane without fear of damaging the aircraft. It is a good bath and a comfortable bed, and can be used on the bottom plane to give access to parts which are otherwise difficult to reach.

Living Conditions and Health of Crew

"Two officers and two airmen can live and sleep in a Southampton in reasonable comfort for short periods, but as the conditions are cramped, the food monotonous and mostly tinned, and fresh water very scarce, it is undesirable for the same men to be in the boats for more than a few days on end. In hot weather, the temperature in the hull is no more than in the cabins of ships under the same conditions. In cold weather, the boats are very cold, even with the cooking stove burning and the ventilation reduced to a minimum with the cockpit covers. Continuous rain, or a moderately rough sea, make conditions on board very uncomfortable. The crew generally slept well in the boats, but occasionally the slapping of the water on the hull bottom and the jerking of the boat at its moorings make sleep difficult. During the cruise, the crew slept on board a good deal. For example, on the last stage, which lasted 41 days, the average number of nights slept in the flying boats was 17 by each officer, and 27 by each airman. The general health of the crews was extraordinarily good considering the climatic conditions. The full crews were available for every flight except two. In each of these cases, one officer had Dengue fever and could have come on with the Flight, but as it was possible for him to travel by other means and rejoin the Flight at the next port, and as the local doctors recommended this course, it was followed. The only accident of any consequence was that an airman upset a frying pan of boiling fat whilst cooking at Hong Kong. This scalded his right leg and foot rather badly, and he was on light duty in the flying boat for some time. He recovered completely, thanks largely to the treatment he received from the medical authorities at the ports visited.

Navigation and Weather

"For the open sea stages, the track made good was found by taking stern bearings on some mark on the sea, either the mark from a wave crest or a stain on the surface produced by dropping a small packet of aluminium powder. Very good land falls were made in each case. The weather reports obtained over most of the route gave little or no information about the wind at height. Such information would be of value in finding the best height to fly. For long stages with no shelter, warning of strong adverse winds is important. Information on the height to which the monsoon winds blow would be very useful; our experience on the Saigon-Bangkok flights (already mentioned) shows that in some cases there is a reverse wind at quite a low height. Information is also required on the height to which typhoons extend, as it may be possible to avoid them by flying above them. We did not meet any really bad weather, none in fact worse than is often met round the British Isles, but there was bad weather about, and if we had been flying at night and unable to see it, we might frequently have run into it, instead of avoiding it. We did not fly in the south-west monsoon on the coast of

Burma, or in the north-east monsoon on the east coast of Malaya, or in the typhoon season in the Philippines, or in the cyclone season on the Australian coast; consequently we did not experience really bad weather conditions; but we could have often got better conditions by flying above the clouds if we could have navigated with reasonable accuracy without sight of sea or land. I doubt whether directional W/T will solve this problem, as it may be dangerous to use your W/T above a bad tropical storm when you need it most.

Take-Off

"The longest 'take-off' time was 60 secs., but the average with full load in the tropics was under 40 secs. When the spare boat was tested, after shipping to Singapore, eight months in the packing cases there, erected and in the open for one month with five hours' flying, its 'take-off' was found to be the same, with the same load and conditions, as the other boats which had been in the open a year with 300 hours' flying.

Risk of Damage

"The times the aircraft were most likely to be damaged were when they were moored in crowded rivers with fast currents, much traffic, and drifting native craft—Basra and Rangoon are examples. The next more serious risk was when motor-boats tried to come alongside the aircraft, or when steam or motor-boats crowded with sightseers came close to the aircraft without realising that the latter swing quickly when moored in a gusty wind. The local authorities at the ports visited were most helpful in assisting the Flight to avoid these risks. Some of the ports visited were very open—Broome and Israelite Bay, for example—and in a few cases the moorings were not secure. Unless moorings have been laid by the harbour authorities, or fishermen, or someone with a good knowledge of seamanship, they should always be tested before the crews leave the flying boats to the guard.

Help by Ships and Air Stations

"The experience of the cruise shows that a flight of flying boats can carry out long cruises, under a wide variety of conditions, working independently of ships and shore stations without any serious delays. We received assistance from ships—for example, H.M.S. Enterprise met us at Bushire and sent in a boat to help us refuel, and entertained the officers and airmen off duty very kindly. Another example is the Philippines, where the U.S. Navy sent tenders to ensure we had every help. We also visited several air bases, and were very kindly entertained and helped. These ships and air bases, and the arrangements they made, were a great assistance to the Flight, and greatly increased the interest and enjoyment of the cruise, but the Flight visited so many places where there were no air bases or ships to help us, that I think there can be no doubt that the Flight could operate independently.

Refitting in the Open

"Practically all the refitting of the aircraft was done in the open, and this was useful experience, but we learnt that, although it can be done in emergency, it is wasteful and inefficient to work without shelter and facilities. Work on and in flying-boats standing in the open on shore is extremely exhausting under tropical conditions, far more so than when

the boats are afloat. In a place like Singapore, where for considerable periods there is generally one or more heavy rain squalls each day, the work is much delayed. Such operations as painting, doping or opening up a plane for examination often have to be put off because of the risk of rain before the work is completed, and when the conditions appear favourable and the work is started, it is often spoilt by a sudden squall wasting the labour and material that has been expended, and leaving the aircraft worse than it was at first. Further, the jury gear used when some part of the aircraft structure is removed for repair must be made strong enough to resist squalls, and handling large aerofoils in gusts is dangerous.

Operation

"The refuelling bases for the Flight were selected to give the best shelter available for 'landing,' refuelling, mooring and 'taking off.' No attempt was made to refuel the boats or 'take off' with a heavy load in the open sea, and I do not think any existing flying-boat, or any one likely to be produced in the near future, will be suitable for such work unless the conditions are very favourable. Our flying-boats were a very convenient size; they were large enough to live in and to carry all we required, and yet were small enough to handle easily and to operate from rivers, shallow lakes, etc. Boats of greater draught or with a longer 'take-off' would not have been able to use several of the places that were suitable for us. We had, of course, to 'take off' sometimes under rather adverse conditions, and the boats did this very well.

Conclusion

"I have not had time in this paper to express adequately the gratitude which the Flight feel for the kindness, courtesy and help which they received wherever they went, for the escorts which were sent out to meet them, or for the receptions and entertainments which were given for them. One of these escorts was a cruise in itself, as the Royal Australian Air Force sent the Amphibian Widgeon II (Wing-Commander Wackatt and Flying Officer Owen) all the way to Broome to meet us on arrival in Australia and escort us to Melbourne.

"I also feel rather guilty for saying so much about the defects which troubled us very little, and so little about the good qualities of the aircraft, engines and other equipment which proved so reliable and satisfactory. My reason for writing this paper as I have done is that I hope the experiences of the Flight which I have tried to describe to you may help the development of flying-boats. I am sure the makers of the aircraft and engines we used are producing others even better than we had. I am also sure that the officers and airmen of the Flying and Base Parties I had the honour to command, worked and lived for the success of the Flight with the greatest loyalty."

At the conclusion of the lecture the Master of Sempill, owing to the lateness of the hour, called upon Sir Sefton Brancker and Lord Thomson for a few remarks, and invited those who wished to raise any points upon the lecture to send their questions or remarks in writing, and these would be replied to by Group Capt. Cave-Browne-Cave in the Journal of the Society.

DINNER TO GROUP-CAPTAIN CAVE-BROWNE-CAVE

FOLLOWING the reading of his paper, Group-Captain H. M. Cave-Browne-Cave was the chief guest at a dinner given by and presided over by Lt.-Col. The Master of Sempill, President of the Royal Aeronautical Society, at the Savoy, which was attended by representatives of the four aeronautical bodies, as follows:—

Air Vice Marshal Sir Vyell Vyvyan, Air Vice Marshal Sir John Higgins, Air Vice Marshal Sir Sefton Brancker, Air Vice Marshal C. L. Lambé, Sir Alan Cobham, Air Commodore J. A. Chamier, Brigadier-General Lord Thomson, Brigadier-General P. R. C. Groves, Sir Robert McLean, Capt. P. D. Acland, Commander J. Bird, Major J. S. Buchanan, Major G. P. Bulman, Major F. A. Bumpus, Wing Commander Cave-Browne-Cave, Capt. A. G. Forsyth, Lord Sempill, Mr. G. H. Coxon, Capt. I. W. Gibson, Group-Capt. N. J. Gill, Mr. A. Marsh Hunn, Mr. C. R. Grey, Mr. F. H. Jones, Mr. W. O. Manning, Mr. R. J. Mitchell, Major J. D. Rennie, Capt. J. L. Pritchard (Secretary, Royal Aeronautical Society), Sir Verdon Roe, Mr. H. Oswald Short, Capt. F. Tymms, Mr. H. T. Vane, Dr. H. C. Watts, Capt. G. S. Wilkinson, Mr. C. G. H. W. Winter, Capt. G. Barnett, Mr. E. C. Bowyer, Mr. C. G. Telebrook, Mr. C. G. Grey, Mr. Stanley Spooner, Mr. Stanhope Sprigg, Major Oliver Stewart, and Major C. C. Turner.

The Master of Sempill, in explaining the toast of the evening, said he could hardly do better than give the wording that appeared on the menu, as follows:—"A dinner to honour Group-Captain Cave-Browne-Cave, D.S.O., D.F.C., F.R.Ae.S., R.A.F., and through him the officers and men of the Royal Air Force who participated in the strikingly successful Empire Cruise of four Supermarine 'Southamptons,' fitted with Napier 'Lion' engines, October 17, 1927—December 11, 1928. England, Australia, Far East." Continuing, the chairman said, speaking personally, he could not refrain from having also in mind those whose work had specially contributed to the successful result, viz., the Supermarine Co., Capt. Acland, Commander Bird, and Mr. H. T. Vane. He then recalled that at the Economic Conference, in 1923, General Smuts said:—

"Communications are the essence of our Empire, and unless we succeed in solving some of the most urgent problems of more rapid and cheaper communications, it will be almost impossible in the future to hold together this vast Empire, scattered over the whole globe."

This statement admirably summarised the cardinal importance of linking the several parts of the Empire together by means of air transport. And what better form of air transport could there be for an island, which was the centre of an ocean state, than the flying-boat? To facilitate this development

we possessed the enormous advantages of our maritime organisation all over the world in the shape of sheltered harbours and naval bases. But although admittedly "Transportation was civilisation" and although, obviously, the new form of transport offered the entire British Commonwealth very special benefits, its development had hitherto been hampered by that scepticism which history showed had hampered the development of every innovation in transport. This great flight should go far to convince the commercial community, not only in this country, but throughout the Empire, that the new form of transport was safe and reliable. The flight has blazed the trail for British commerce, and that in itself was a very great achievement; but it had done more; it had shown the British flag to the farthest part of our farthest Dominion and to all the intervening British Dependencies. It had proved that by making use of our sea communications for aircraft operation we can establish closer political as well as commercial cohesion between the several parts of the Empire and that the aerial arm could reach out to the Antipodes to defend our Dominions and Dependencies in case of need. It had shown, in a word, that we can, by developing aviation (both military and civil), give the entire Empire greater cohesion both in peace and in war. Nor was that all, for the value of this achievement extended beyond the confines of the Empire—great as they were—for this flight over a period of eleven months and half way round the globe, had demonstrated to the whole civilised world that British machines, British engines, and last but not least, British flying personnel—mechanics as well as pilots—were second to none. A special effort, however, appeared to be necessary to arouse our commercial community to the importance of this new form of transport. In carrying out this great flight the Government had given a lead which it is up to the commercial community of this country to follow.

Group-Capt. Cave-Browne-Cave, in responding, said he thanked them for the reception given him and he could only say that throughout all of them were pleased with their aircraft and the engines which never let them down and so far as the crew were concerned they had had the time of their lives.

The Chairman then said they could hardly let the evening pass without congratulating Sir A. V. Roe, one of their guests, upon the honour just conferred upon him by the King.

Sir Verdon Roe thanked them for their good wishes and said that one thing he would like to know was whether Group-Capt. Cave-Browne-Cave had found any way of preventing the rivet heads from rusting away.

A general and more intimate discussion then followed upon the very enjoyable and instructive evening.

International Aircraft Exhibition

H.R.H. THE PRINCE OF WALES will open the International Aero Exhibition at Olympia on July 16. At least Great Britain, America, France, Germany and Italy will be represented. It has been decided by the Royal Aero Club to recommend that a rally of all clubs and private owners should be held during the period of the International Aero Exhibition, and that one day's racing should include the Grosvenor Cup and Siddeley Trophy. The question of holding the rally and races at Heston Aerodrome, Middlesex, has been agreed to, subject to satisfactory arrangements being made.

Canadian Club Flying

THE Winnipeg Flying Club, which started on May 29, 1928, accumulated 1,005 flying hours by the end of the year, which involved well over 7,000 flights. Forty-two members, including a dozen ex-war pilots, went solo, and 30 private or commercial licences were obtained. Miss Dorothy Bell, the club's second lady pilot and the fifth in Canada, secured her ticket on January 24, when the temperature was 15° below zero. The first lady to be trained by the club, last summer, was Miss Eileen Magill, and she was Canada's second lady pilot.



MARCH 7, 1929

THE ROYAL AIR FORCE

London Gazette, February 26, 1929.

General Duties Branch

B. F. Cox is granted a permanent commn. as a Pilot Officer, with effect from Jan. 31, and with seny. of Jan. 31, 1928; M. V. de Satge is granted a short service commn. as a Pilot Officer on probation, with effect from and with seny. of Feb. 1. The follg. Pilot Officers are promoted to rank of Flying Officer:—L. W. W. Modley, A. L. T. Naish, M. G. R. Harris (Jan. 8); A. P. Miller (Jan. 18); F. R. Worthington, C. M. Grierson, C. D. C. Boyce, C. H. Turner (Jan. 30). The follg. are promoted, with effect from Feb. 27:—*Flight-Lieutenants to be Squadron-Leaders*.—N. W. Wadham, H. W. Evens. *Flying Officers to be Flight-Lieutenants*.—F. J. O'Doherby, H. S. Dawe, A. D. Davies, G. R. M. Clifford, H. M. Mellor, A. King-Lewis, L. S. Potter, R. S. Barbour, P. Slocombe, W. J. Pearson, S. Wallingford, G. H. Randle, C. E. Nicholls, N. Carter, C. Walter.

Flying Officer L. S. Tindall takes rank and precedence as if his appointment as Flying Officer bore date Dec. 28, 1928. Reduction takes effect from Jan. 4, 1929; Flying Officer J. Summers is transferred to Reserve, Class A (Feb. 10); Pilot Officer E. S. Beaverstock resigns his short service commn. (Feb. 13); Pilot Officer H. Box relinquishes his short service commn. on account of ill-health (Feb. 7).

Stores Branch

Flying Officer J. W. Stokes is granted a permanent commn. in this rank, with effect from Oct. 15, 1927, on completion of probationary service.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leader G. S. M. Insall, V.C., M.C., to H.Q., Air Defence of Great Britain, Uxbridge; 4.3.29.

Flight Lieutenants: A. D. H. Foster, to H.Q., Iraq; 23.2.29. R. H. Horniman, to H.Q., Iraq; 23.2.29.

Flying Officers: R. T. Taaffe, to No. 55 Sqdn., Iraq; 23.2.29. E. S. C. Davis, to No. 70 Sqdn., Iraq; 23.2.29.

IN PARLIAMENT

German Airship Flight

MR. LOCKER-LAMPSON on February 27, in reply to Lieut.-Comdr. Kenworthy, said the German Ministry for Foreign Affairs inquired unofficially of His Majesty's Embassy at Berlin on February 13 as to the attitude of His Majesty's Government towards a proposed flight of the airship "Graf Zeppelin." After consultation with the Secretary of State for Air and His Majesty's High Commissioner, Cairo, I instructed Sir Horace Rumbold on February 16 to reply to these unofficial representations that His Majesty's Government were opposed to the proposed flight. It was quite understood between the Egyptian Government and ourselves, and indeed it was mentioned when the treaty with Sarwat Pasha was under discussion, that foreign aviation should not take place over Egypt without an agreement between the two parties.

Civil Aviation Aerodromes

SIR R. GOWER, on March 4, asked the Secretary of State for Air what air ports there are in the United Kingdom; what arrangements are being made for the establishment of others; and whether he will consider the suitability of the district of the Medway towns for the purpose?

SIR S. HOARE: As regards the first two parts of the question, there are at present four "Customs aerodromes," situated at Croydon, Lympne, Southampton and Dover. Sites for similar aerodromes at Harwich, Hull and Leith will probably be approved shortly, and the approval of further sites for the Customs clearance of passenger traffic only at certain (probably the following) seaports is under consideration: Plymouth, Newhaven, London, Grimsby (or Immingham), Goole, Middlesbrough, Newcastle-on-Tyne, Greenock, Belfast, Liverpool, Birkenhead, Swansea, Penarth and Avonmouth. If "air ports" includes aerodromes generally, I would refer to the reply given on November 28 last, giving the number of such aerodromes. In addition, the agreement proposed to be made with National Flying Services, Limited, will provide for the provision of 20 new aerodromes and 80 new landing grounds in this country within three years. As regards the last part of the question, the Medway district is not considered altogether suitable for a Customs aerodrome for marine aircraft, and the establishment of one for land aircraft there is hardly necessary in view of the existence of Croydon and Lympne.

SIR S. HOARE, in reply to a further question, said the only site at present licensed to a local authority is that of part of the foreshore at Southport. As a result of the circular letter sent by the Air Ministry to town clerks last October, a large number of municipal authorities are now taking an active interest in the establishment of aerodromes. In 31 cases suitable sites have already been inspected by the Air Ministry; in 14 cases sites have been selected and will be inspected; while in 15 more, active consideration is being given to the matter.

Aircraft

There are on the British Register 234 British civil aircraft employed commercially, including those owned by light aeroplane clubs. As regards the last part of the question, I hope to deal with the development of civil aviation in general in my speech on the Air Estimates.

Clubs

The following list gives the names and number of flying members of the subsidised light aeroplane clubs as on December 31, 1928, and the names of the unsubsidised and service clubs; no information is available regarding the membership of the last two categories of clubs.

Subsidised light aeroplane clubs (flying members): London, 277; Midland, 138; Newcastle-upon-Tyne, 136; Yorkshire, 130; Lancashire, 225; Hampshire, 235; Bristol and Wessex, 118; Norfolk and Norwich, 123; Scottish, 181; Nottingham, 48; Suffolk and Eastern Counties, 35; Cinque Ports, 59; Liverpool and District, 102; total, 1,807.

Unsubsidised clubs: Southern, Northamptonshire, Berks, Bucks and Oxon, Isle of Purbeck, The Household Brigade Flying Club, The Sheffield Flying Club (in course of formation).

Service clubs: Halton, Royal Aircraft Establishment (Farnborough), Marine Aircraft Experimental (Establishment (Felixstowe)).

Auxiliary Air Force. Esher Efficiency Challenge Trophy

THE AIR MINISTRY announces:—The trophy presented by the Rt. Hon. Viscount Esher, G.C.B., G.C.V.O., P.C., to be awarded annually to the Squadron of the Auxiliary Air Force adjudged to be the best all-round

Medical Branch

C. Crowley, M.B., is granted a short service commn. as Flying Officer, with effect from Jan. 16, and is seconded to Manor House Hospital, Golders Green.

Chaplains' Branch

The Rev. H. Thomas, B.A., is granted a permanent commn. (Jan. 1).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. Pilot Officers are promoted to rank of Flying Officer:—A. M. Lester (Jan. 28); T. P. Mulcahy (Jan. 29); H. P. Fraser (Feb. 2); P. Booth (Feb. 4); E. Rea (Feb. 11). Pilot Officer on probation E. M. S. Spence is confirmed in rank (Feb. 6).

The follg. Flying Officers are transferred from Class B to Class C:—S. G. Newport (Feb. 7); A. A. C. N. Smith (Jan. 30).

Flying Officer B. F. Cox relinquishes his commn. in Class A.A. on appointment to a permanent commn. (Jan. 31).

AUXILIARY AIR FORCE

General Duties Branch

No. 605 County of Warwick (Bombing) Squadron.—The follg. Pilot Officer relinquishes his commn. on appointment to a short service commn. in the R.A.F.:—M. B. de Satge (Feb. 1).

Stores Branch

Flight Lieutenant R. A. Young, to Aircraft Depot, Iraq; 23.2.29. *Flying Officer* C. I. Fry, to No. 208 Sqdn., Middle East; 23.2.29.

Accountant Branch

Flying Officer F. J. S. Short, to No. 1 Stores Depot, Kidbrooke; 23.2.29.

Medical Branch

Flight Lieutenant F. B. C. L. Crawford, M.B., to R.A.F. Depot, Uxbridge 19.1.29.

Flight Lieutenants (Dental): S. A. McCormack, to Station H.Q., Helopolis; 1.1.29. P. P. Hogan, to R. A.F. Depot, Middle East; 1.1.29.

Squadron of the year, has been won for the year 1928 by No. 601 (County of London) Squadron, commanded by Squadron Leader Lord Edward Grosvenor. The trophy was presented to the Squadron by Sir Samuel Hoare, Secretary of State for Air on February 28, at the Town Headquarters of the Squadron, 54, Kensington Park Road, Notting Hill, W. 11.

AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations: Cyl. = cylinder, i.e. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

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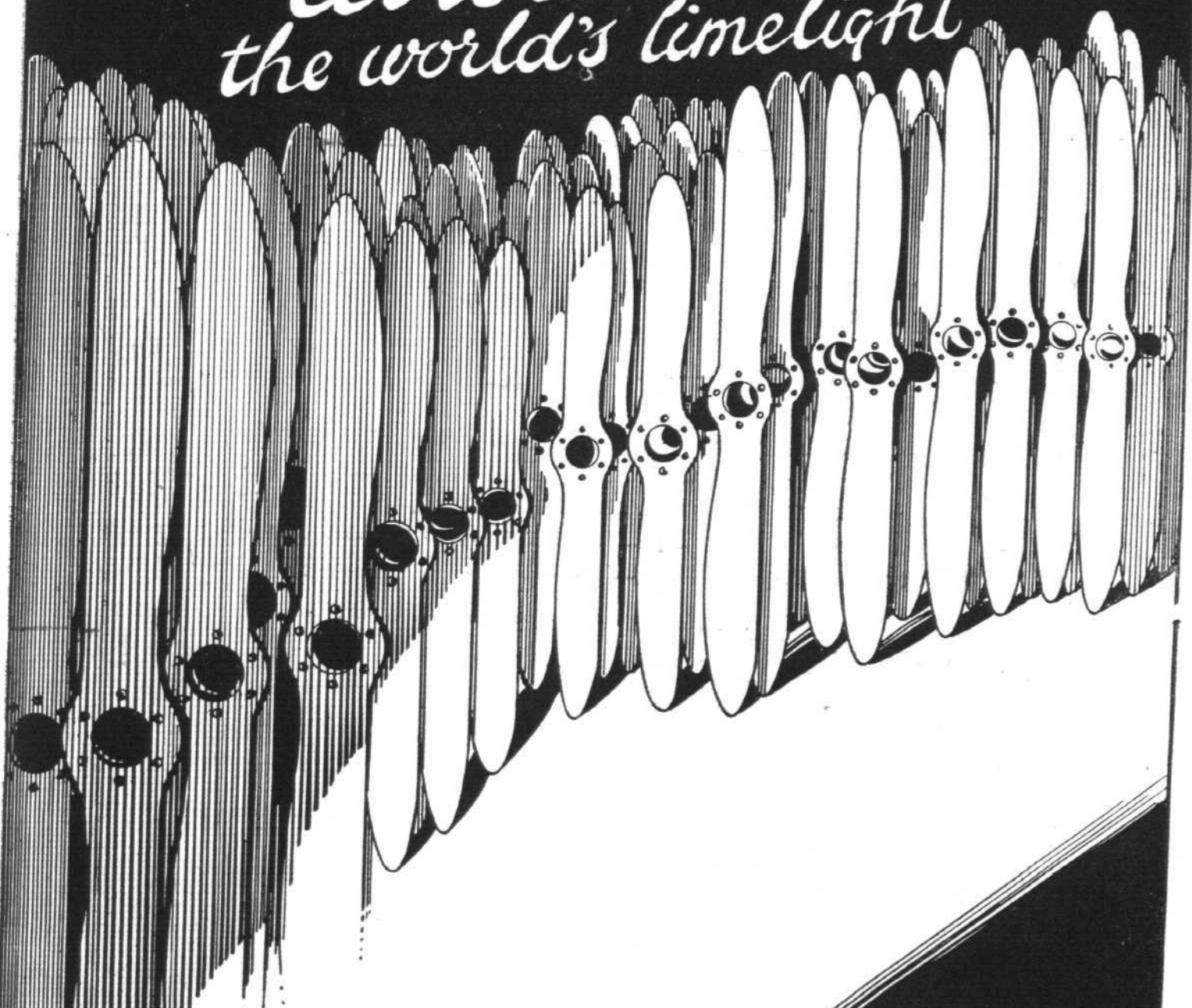
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On ground ... 51 hrs. 45 m.
Total ... 348 hrs. 55 m.

Machine Miles:—25,472.

Replacements:—5 valve caps, 1 oil connecting nipple, 1 valve spring, 1 set plugs.

Value of replacements (excluding plugs):—14/6d.

Fuel used:—Shell Motor Spirit.

Oil used:—Shell Super-heavy Aviation.

During the period of running the engine was not touched for repair purposes except for fitting the above-mentioned replacements. At the end of the period the engine was removed for overhaul, running perfectly and giving full revolutions.

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